

**PITHAPUR RAJAH'S GOVERNMENT COLLEGE (A),
KAKINADA**

Accredited by NAAC with B++ Grade



DEPARTMENT OF ZOOLOGY & AQUACULTURE

BOARD OF STUDIES

B.Sc. (Honours) ZOOLOGY
(Single Major System)



(2026-2027)

CHOICE BASED CREDIT SYSTEM
(Convened on 30-06-2026)

**PITHAPUR RAJAH'S GOVERNMENT COLLEGE (A),
KAKINADA**

Re-Accredited by NAAC with B++ Grade



**DEPARTMENT OF ZOOLOGY
&
AQUACULTURE**

BOARD OF STUDIES

B.Sc. AQUACULTURE
(Single Major System)

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Choice Based Credit System
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PROCEEDINGS OF THE PRINCIPAL (FAC), PITHAPUR RAJAH'S GOVT. COLLEGE [A], KAKINADA
Present: Dr. Kandula Anjaneyulu, M.A, Ph.D.

Rc.No.4/A.C/BOS- UG & PG /2026-27

Dt.17 June 2026

Sub: P.R. Government College (Autonomous), Kakinada – Academic Cell – Conduct of Board of Studies (BoS) Meetings for UG and PG Programmes for the Academic Year 2026–27 – Communication of Guidelines – Regarding.

ORDER:

The autonomous colleges, in alignment with their vision, mission, stated objectives, and core values, are mandated to design and develop their own outcome-based curricula. This must be done with due consideration for societal, local, and global industry requirements, employability, and the development of industry-ready and transferable skills. Accordingly, every programme shall prescribe Course Outcomes (COs), Programme Outcomes (POs), and Programme Specific Outcomes (PSOs) along with a suitable learning outcome assessment management system, supported by a robust and transparent evaluation mechanism to measure attainment levels among students.

Further, the A.P. State Council of Higher Education (APSCHE) has introduced a revised curricular framework effective from the Academic Year 2025-26, incorporating Skill Enhancement Courses, Multi-Disciplinary courses, the Indian Knowledge System and a revised credit structure.

Our institution, from the Academic Year 2022–23 onwards, has defined a renewed vision and mission along with updated objectives and core values, necessitating the design and reorientation of its academic and research administration in line with these directives.

In light of the above responsibilities prescribed by the institution's vision and mission, NEP–2020, NAAC, NIRF, and the APSCHE's revised and new UG and P.G. curricular framework, it is imperative to customize, design, and re-orient our academic and research activities to meet the expectations of students, industries, and government stakeholders.

Accordingly, the Chairpersons of the U.G and P.G Boards of Studies (BoS) of various departments are hereby requested to make necessary arrangements to convene their BoS meetings from **25 June to 30 June 2026**.

The Chairpersons are further instructed to:

1. Prepare the curricula and extracurricular activities for the Academic Year 2026–27 in line with the institution's vision, mission, NEP–2020, and NIRF norms.
2. Devise an appropriate evaluation system to ensure effective learning outcomes and holistic student development.
3. Ensure that the curriculum design includes a **20% revision** of the syllabus each year without deviating from the APSCHE prescribed syllabus.

framed by the BOS committee concerned with duly following the mandate prescribed above.

5. Engage stakeholders viz employers, parents, and alumni, to obtain feedback on the existing curricula and to invite suggestions for improvements.
6. Invite the University nominee, subject experts, industry representatives, student representatives, and parent representatives well in advance. The meeting notice shall clearly specify the date, venue, and agenda, and a soft copy of the agenda and relevant documents shall be circulated for their perusal.
7. Ensure that the subject experts invited preferably hold a Doctorate with at least 10 years of teaching experience and have relevant expertise in designing industry-related, market- and job-oriented curricula.
8. Facilitate thorough deliberations on curriculum design, evaluation methods, incorporation of research components, measures to enhance learning experiences, and optimal utilization of existing human, physical, and ICT resources.
9. Conduct all BoS meetings in offline mode. Online participation shall be permitted only under exceptional circumstances.
10. Prescribe benchmarking and quality initiatives in pedagogy and learning, including strategies for curriculum design and teaching-learning processes, in collaboration with the IQAC Coordinator, prior to the BoS meeting.
11. Ensure that a minimum student attendance of **75%** shall be required for eligibility to appear for I & II Mid-Term Examinations under the CIA component; this shall be formally approved in the BoS meeting.
12. Approve any new programmes to be introduced for the Academic Year 2025–26, the number and frequency of certificate courses, and SWAYAM MOOCs courses.
13. Submit the approved BOS copies in the prescribed format, in **quadruplicate (hard copies)** to the Academic Cell for onward submission to the IQAC, Examination Cell, and Library, within **three days** of the meeting and upload the soft copy in their respective department web pages in the college website.
14. Ensure strict alignment of all recommendations and curriculum changes with the institution's vision and mission.
15. Submit a request to receive advance funds from the Examination cell through Principal for conducting BoS meetings.

Following contents shall be presented in the BOS document in the order

1. Proceedings of the Principal pertaining to BOS
2. Composition of BOS
3. Vision and Mission of the department
4. Agenda: It shall include ATR on the previous BOS meeting first, resolutions, etc., later.
5. Table showing the Allocation of Credits in the following table for both theory and Practicals' in case of science subjects

S. No	Semester	Title of the Course (Paper)	Hrs./week	Max. Marks (SEE)	Marks in CIA	Credits
1	III	Physical Chemistry-1	3	50	50	4

6. Resolutions adopted in the meeting with detailed discussion that took place during the meeting.
7. Each BOS Chairman shall, immediately after syllabus, tabulate the changes made in the syllabus/ paper along with justification.
8. Attendance of Members present with signatures in the tabular form.
9. List of Examiners & Paper setters (Minimum 20 members and at least 02 members from other states)
10. Syllabus for each course (both theory & Practical in case of Science subjects) followed by model question papers (theory & practical) and allocation of CIA (50marks) for each course with structure.
11. Each student (2025-26 AB) has to complete one MOOCS course from SWAYAM in any subject per year.

CIA structure for Single Major system

- Out of 50 marks for CIA, 25 marks are allocated for Mid examinations. In each semester two mid examinations to be conducted and the average of the two will be considered.
- Mid examinations are to be conducted in offline mode at college level
- Mid examination to be conducted in offline mode in which the student should attempt **one essay** question for ten marks out of two questions, **three short** answer questions with five marks each out of five questions
- The remaining 25 marks for CIA are allocated as per the following structure.

Project-10M	Seminar- 5M	Assignment- 5M	Viva on theory- 3M	Clean & green and Attendance- 2M
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The Chairpersons of all Boards of Studies are hereby instructed to comply with these directives in letter and spirit to ensure the highest standards of academic and administrative excellence


PRINCIPAL
Pithapur Rajah's Government College(A)
Kakinada

Copy to:

1. Lecturers-in-Charge (BOS Chairmen) of all the departments
2. Academic Coordinator
3. IQAC coordinator
4. Controller of Examinations
5. Office

PR Government College (A), Kakinada
Department of Zoology & Aquaculture
Consolidated Report of Board of studies in UG Zoology convened on 11-08-2025

S.No	Name of the Person	Designation
1.	Sri.B. Chakravarthi	Chairman & Lecturer Incharge, Department of zoology & Aquaculture
2.	Dr.K. Ramaneswari	University Nominee, Adikavi nannaya University, Rajamahendravaram
3.	Smt. M. Vasantha Lakshmi	Subject Expert: I, Lecturer in Zoology, ASD Govt. college for women (A), Kakinada
4.	Dr. D. Sailaja	Subject Expert: II, Lecturer in Zoology, GDC (A), Rajamahendravaram
5.	Dr.P. RamaMohanRao	Representative from Industry, Aqua industry Consultant
6.	Dr. P. Kiran Kumar	Member
7.	Dr. B. Elia	Member
8.	Ms, M.S.V. Lakshmi	Member
9.	Sri.T.VenkateswaraRao	Member
10.	Y.Gowthami	Member
11.	B. Devi	Member
12.	T.Sushma	Member
13.	C. Smyrna	Member
14.	V.Lakshminarasamma	Alumni
15.	Sanjana	Student Member III B.SC. Zoology
16.	K, Chandini	Student Member II B.SC. Zoology



PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS),
KAKINADA 533 001-ANDHRA PRADESH
An AUTONOMOUS and NAAC Accredited Institution (B++ Grade- 2.82 CGPA)
(Affiliated to ADIKAVI NANNAYA UNIVERSITY, Rajamahendravaram.)

ACADEMIC CELL

(Certificate to be issued by the University Nominee/Subject Expert/Member of BOS)

Department Name: Zoology & Aquaculture

Name of the BOS Member : Dr. P. Rama Mohan rao

(University Nominee /Subject Expert/Industrialist / Member)

I certify that the syllabus submitted by the Zoology (U.G) Department is verified
by me and I recommend the following suggestions:

- 1.
- 2.
- 3.
- 4.
- 5.

No Suggestions.
Approved.

The syllabus is approved with the above suggested modification

J. Lahari

Signature with Date

Note: BOS Members are requested to fill the above details with necessary suggestions and send back to the Head of the department along with the syllabus



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(Affiliated to ADIKAVI NANNAYA UNIVERSITY, Rajamahendravaram.)

ACADEMIC CELL

(Certificate to be issued by the University Nominee/Subject Expert/Member of BOS)

Department Name: Zoology

Name of the BOS Member : Dr. P. Vijaya Nirmala

(University Nominee /Subject Expert/Industrialist / Member)

I certify that the syllabus submitted by the Zoology (P.G.) Department is verified by me and I recommend the following suggestions:

- 1.
- 2.
- 3.
- 4.
- 5.

The syllabus is approved with the above suggested modification

P Vijaya Nirmala
Signature with Date

Note: BOS Members are requested to fill the above details with necessary suggestions and send back to the Head of the department along with the syllabus



PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
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(Affiliated to ADI KAVI NANNAYA UNIVERSITY, Rajamahendravarm.)

ACADEMIC CELL

(Certificate to be issued by the University Nominee/Subject Expert/Member of BOS)

Department Name: Zoology & Aquaculture

Name of the BOS Member : M. Vasantha Lakshmi

University Nominee /Subject Expert/Industrialist / Member)

I certify that the syllabus submitted by the Zoology (U-4) Department is
verified by me and I recommend the following suggestions:

Syllabus is approved with the above suggested modification

SEMESTER I

COURSE 1 ANIMAL DIVERSITY – I: BIOLOGY OF NON-CHORDATES

SYLLABUS

UNIT – I

- 1.1 Whittaker's five kingdom concept and classification of Animal Kingdom.
- 1.2 Protozoa: General characters and classification up to classes with suitable examples.
- 1.3 Protozoa: Locomotion & nutrition.
- 1.4 Protozoa: Reproduction.

Activity: Assignment / Seminar on the above.

Evaluation: Marks to be awarded for written and oral presentations.

UNIT – II

- 2.1 Porifera: General characters and classification up to classes with suitable examples.
- 2.2 Canal system in sponges.
- 2.3 Coelenterata: General characters and classification up to classes with suitable examples.
- 2.4 Polymorphism in coelenterates & corals and coral reefs.

Activity: Assignment / Seminar / Quiz / Project on the above.

Evaluation: Evaluation of written part; evaluation of oral presentation; assessment of students in Quiz participation and Ranking; evaluation of Project Report and oral.

UNIT – III

- 3.1 Platyhelminthes: General characters and classification up to classes with suitable examples.
- 3.2 Parasitic adaptations in helminths.
- 3.3 Nematelminthes: General characters and classification up to classes with suitable examples.
- 3.4 Life cycle and pathogenicity of *Ascaris lumbricoides*.

Activity: Assignment / Seminar / Quiz / Project / Peer teaching on the above.

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity.

UNIT – IV

- 4.1 Annelida: General characters and classification up to classes with suitable examples.
- 4.2 Vermiculture – Scope, significance, earthworm species, processing, Vermicompost, economic importance of vermicompost.
- 4.3 Arthropoda: General characters and classification up to classes with suitable examples.
- 4.4 Peripatus – Structure and affinities.

Activity: Assignment / Seminar / Quiz / Project / Peer teaching on the above.

UNIT – V

- 5.1 Mollusca: General characters and classification up to classes with suitable examples.
- 5.2 Pearl formation in Pelecypoda.
- 5.3 Echinodermata: General characters and classification up to classes with suitable examples; Water vascular system in star fish.
- 5.4 Hemichordata: General characters and classification up to classes with suitable examples; Balanoglossus – Structure and affinities.

Activity: Assignment / Seminar / Quiz / Project / Peer teaching on the above.

SEMESTER I
COURSE 1 ANIMAL DIVERSITY – I: BIOLOGY OF NON-CHORDATES

BLUE PRINT

Time: 2 hrs | Max. Marks: 50

Unit	Essay	Short
I	1	1
II	1	1
III	1	2
IV	1	1
V	2	2
Total	6	7

- Out of 6, 3 questions should be answered ($3 \times 10 = 30$ M)
- Out of 7, 4 questions should be answered ($4 \times 5 = 20$ M)

SEMESTER I
COURSE 1 ANIMAL DIVERSITY – I: BIOLOGY OF NON-CHORDATES

MODEL QUESTION PAPER

Time: 2 hrs | Max. Marks: 50

SECTION – A

Answer any THREE of the following. Choosing at least one from each part. Draw labeled diagrams wherever necessary. ($3 \times 10 = 30$ M)

PART – I

1. What is the Whittaker's Five Kingdom concept and how does it classify the animal kingdom?
2. Describe the Canal system in sponges.
3. Explain Parasitic Adaptations in Helminthes.

PART – II

4. Explain preparation and economic importance of Vermicompost.
5. Describe the Pearl formation in Pelecypoda.
6. Describe the Water vascular system in star fish.

SECTION – B

Answer any FOUR of the following. Draw labeled diagrams wherever necessary ($4 \times 5 = 20$ M)

7. Asexual reproduction in protozoa.
8. Coral reefs.
9. Trematoda.
10. Pathogenicity of Ascaris.
11. Insecta.
12. Gastropoda.
13. Affinities of Balanoglossus.

SEMESTER I
COURSE 1 ANIMAL DIVERSITY – I: BIOLOGY OF NON-CHORDATES

QUESTION BANK

Essay Questions

UNIT – I

1. What is the Whittaker's Five Kingdom concept and how does it classify the animal kingdom.
2. Describe the general characters and classification of Protozoa up to classes with suitable examples.
3. Give an account of locomotion, nutrition, and reproduction in Protozoa.
4. Give an account of nutrition in Protozoa.
5. Explain sexual reproduction in Protozoa.

UNIT – II

6. Describe the general characters and classification of Porifera up to classes with suitable examples.
7. Explain the canal system in sponges and its significance.
8. Discuss polymorphism in Coelenterates and add a note on corals and coral reefs.

UNIT – III

9. Write an essay on the general characters and classification of Platyhelminthes up to classes with suitable examples.
10. Describe the parasitic adaptations in helminths.
11. Explain the life cycle and pathogenicity of *Ascaris lumbricoides*.

UNIT – IV

12. Give an account of the general characters and classification of Annelida up to classes with suitable examples.
13. Explain preparation and economic importance of Vermicompost.
14. Describe the structure and affinities of *Peripatus*.

UNIT – V

15. Explain the general characters and classification of Mollusca up to classes with suitable examples.
16. Describe the process of pearl formation in Pelecypoda.
17. Write an essay on the water vascular system in Starfish.
18. Discuss the affinities of *Balanoglossus*.

Short Answer Questions

UNIT I

1. Whittaker's five kingdom system
2. Asexual reproduction in protozoa
3. Types of locomotory organelles in Protozoa

UNIT II

4. Asconoid type of canal system
5. Polyp and medusa

6. Coral reefs

UNIT III

7. Parasitic adaptations

8. Turbalaria

9. *Ascaris lumbricoides*

UNIT IV

10. Role of earthworms in soil fertility

11. Vermicomposting

12. Insecta

13. *Peripatus*

UNIT V

14. Economic importance of Molluscs

15. Functions of the water vascular system in starfish

16. Affinities and position of *Balanoglossus*

REFERENCES AND PROJECTS

CO-CURRICULAR ACTIVITIES

1. Preparation of chart/model of phylogenetic tree of life, 5-kingdom classification.
2. Visit to Zoology Museum or Coral Island as part of Zoological tour.
3. Charts on polymorphism.
4. Clay models of canal system in sponges.
5. Plaster-of-Paris model of *Peripatus*.
6. Construction of a vermicompost in each college, manufacture of manure by students and donating to local farmers.
7. Chart on pearl forming layers using clay.
8. Visit to a pearl culture rearing industry/institute.

REFERENCE BOOKS

1. L.H. Hyman, The Invertebrates, Vol. I, II and V. McGraw 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. W.B. Saunders Co., 1986.
5. Barrington, E.J.W., Invertebrate Structure and Function. 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. Macmillan Co., London.
8. Barnes, R.D. (1982), Invertebrate Zoology, V Edition.-

SEMESTER I
COURSE 1 ANIMAL DIVERSITY – I: BIOLOGY OF NON-CHORDATES

PRACTICAL SYLLABUS

1. Study of museum slides / specimens / models (Classification of animals up to orders).
2. Protozoa: Amoeba, Paramecium, Paramecium Binary fission and Conjugation, Vorticella, Entamoeba histolytica, Plasmodium vivax.
3. Porifera: Sycon, Spongilla, Euspongia, Sycon- T.S & L.S, Spicules, Gemmule.
4. Coelenterata: Obelia – Colony & Medusa, Aurelia, Physalia, Velella, Corallium, Gorgonia, Pennatula.
5. Platyhelminthes: Planaria, Fasciola hepatica, Fasciola larval forms – Miracidium, Redia, Cercaria, Echinococcus granulosus, Taenia solium, Schistosoma haematobium.
6. Nematelminths: Ascaris (Male & Female), Dracunculus, Ancylostoma, Wuchereria.
7. Annelida: Nereis, Aphrodite, Chaetopterus, Hirudinaria, Trochophore larva.
8. Arthropoda: Cancer, Palaemon, Scorpion, Scolopendra, Sacculina, Limulus, Peripatus.
9. Larvae - Nauplius, Mysis, Zoea, Mouth parts of male & female Anopheles and Culex, Mouthparts of Housefly and Butterfly.
10. Mollusca: Chiton, Pila, Unio, Pterodo, Murex, Sepia, Loligo, Octopus, Nautilus, Glochidium larva.
11. Echinodermata: Asterias, Ophiothrix, Echinus, Clypeaster, Cucumaria, Antedon, Bipinnaria larva.
12. Hemichordata: Balanoglossus, Tornaria larva.

Dissections:

- Computer-aided techniques should be adopted or show virtual dissections. Dissection of edible (Prawn/Pila) invertebrate as per UGC guidelines.
- An “Animal album” containing photographs, cut outs, with appropriate write up about the above-mentioned taxa. Different taxa/ topics may be given to different sets of students for this purpose.

REFERENCE WEB LINKS:

- <https://virtualmicroscopy.peabody.yale.edu/>
- <https://tnhm.in/category/assorted-gallery-for-vertebrates-and-invertebrates/invertebrates/>
- <http://www.nhc.ed.ac.uk/index.php?page=24.25.312>
- <https://biologyjunction.com/invertebrate-notes/>
- <https://lanwebs.lander.edu/faculty/rsfox/invertebrates/>
- <https://www.youtube.com/watch?v=iqrVmz625WA>
- <https://www.youtube.com/watch?v=5VlJ59oX7G0>
- <https://www.youtube.com/watch?v=sMutOON6zHE>
- <https://www.youtube.com/watch?v=zSTYRtliac0>

SEMESTER I
COURSE 1 ANIMAL DIVERSITY – I: BIOLOGY OF NON-CHORDATES

PRACTICAL MODEL QUESTION PAPER

Time: 2 hrs | Max marks: 50

I. Identify the following specimens or spotters & slides, draw neat labeled diagram. Write notes on (6x5=30M):

1. Paramecium
2. Euspongia
3. Physalia
4. Fasciola hepatica
5. Ascaris
6. Hirudinaria

II. Dissect and draw the labeled diagram of Prawn Nervous system (1x10=10M)

III. Practical Record (5M)

IV. Viva-voce (5M)

SEMESTER I
COURSE 2 ANIMAL DIVERSITY – II: BIOLOGY OF CHORDATES

SYLLABUS

UNIT - I

General characters and classification of Chordata up to classes. Salient features of Cephalochordata, Salient features of Urochordata. Structure and life history of Herdmania, Retrogressive metamorphosis – Process and Significance. Cyclostomata, General characters, Comparison of Petromyzon and Myxine.

Activity: Model preparation /Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above.

UNIT - II

General characters of Fishes, Salient features Dipnoi. Scoliodon: External features, Digestive system, Respiratory system. Scoliodon Structure and function of Heart, Structure and functions of the Brain. Migration in Fishes, Types of Scales.

Activity: Model preparation /Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above.

UNIT - III

General characters of Amphibia, General characters of Reptilia. Rana hexadactyla: External features, Respiratory system, Structure and function of Heart, structure and functions of the Brain. Calotes: External features, Digestive system, structure and function of Brain. Identification of Poisonous snakes.

Activity: Model preparation /Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above.

UNIT - IV

General characters of Aves. Columba livia: External features, Digestive system, Respiratory system. Columba livia: Structure and function of Heart, structure and function of Brain. Migration in Birds, Flight adaptation in birds.

Activity: Model preparation/Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above.

UNIT - V

General characters of Mammalia. Classification of Mammalia up to sub - classes with examples. Comparison of Prototherians, Metatherians and Eutherians. Dentition in mammals, Aquatic mammals Adaptations.

Activity: Model preparation/Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above.

SEMESTER I
COURSE 2 ANIMAL DIVERSITY – II: BIOLOGY OF CHORDATES

BLUE PRINT

Time: 2 1/2 hrs | Max. Marks: 50

Unit	Essay	Short
I	1	1
II	1	1
III	1	2
IV	1	1
V	2	2
Total	6	7

- Out of 6, 3 questions should be answered ($3 \times 10 = 30$ M)
- Out of 7, 4 questions should be answered ($4 \times 5 = 20$ M)

SEMESTER I
COURSE 2 ANIMAL DIVERSITY – II: BIOLOGY OF CHORDATES

MODEL QUESTION PAPER

Time: 2 hrs | Max. Marks: 50

SECTION - A

Answer any THREE of the following. Choosing at least one from each part. Draw labeled diagrams wherever necessary (3x10=30 M)

PART- I

1. Explain the life history of Herdmania.
2. Explain the process of migration in fishes.
3. Explain the process of digestion in Scoliodon.

PART- II

4. Describe the flight adaptations in birds.
5. Describe the Aquatic adaptation in mammals.
6. Write an essay on dentition in mammals.

SECTION - B

Answer any FOUR of the following: Draw labeled diagrams wherever necessary (4x5=20 M)

7. Cyclostomata
8. Placoid Scales
9. Hibernation
10. Apoda
11. Archaeopteryx
12. Mammary glands
13. Canines

SEMESTER I
COURSE 2 ANIMAL DIVERSITY – II: BIOLOGY OF CHORDATES

QUESTION BANK

Essay Questions

UNIT-I

1. Explain the life history of Herdmania
2. Describe the process of retrogressive metamorphosis and its significance
3. Illustrate the comparison between Petromyzon and Myxine

UNIT-II

4. Explain the process of migration in fishes
5. Explain the process of digestion in Scoliodon
6. Discuss the general characters of fishes and add a note on the salient features of dipnoi

UNIT-III

7. Explain the external features of Calotes
8. Describe the general characters of Amphibia
9. Describe the Structure and function of heart in Rana
10. Give a detailed description on the process of identification of poisonous snakes

UNIT-IV

11. Describe the flight adaptations in birds
12. Explain the respiratory system of Columba livia
13. Describe the general characters of Aves

UNIT-V

14. Write an essay on dentition in mammals
15. Describe the Aquatic adaptation in mammals
16. Explain the general characters of mammals

Short Answer Questions

UNIT-I

(No specific short questions provided in source)

UNIT-II

1. Placoid scale
2. Lateral line
3. Elasmobranch

UNIT-III

4. Apoda
5. Crocodilia
6. Hibernation

UNIT-IV

7. Quill feather
8. Archaeopteryx
9. Claws
10. Adaptation

UNIT-V

11. Prototheria
12. Canines
13. Mammary glands

REFERENCES AND PROJECTS

CO-CURRICULAR ACTIVITIES

1. Preparation of charts on Chordate classification (with representative animal photos) and retrogressive metamorphosis.
2. Clay models of Herdmania and Amphioxus.
3. Visit to local fish market and identification of local cartilaginous and bony fishes.
4. Maintaining of aquarium by students.
5. Model of fish heart and brain.
6. Preparation of slides of scales of fishes.
7. Visit to local/nearby river to identify migratory fishes and prepare study notes.
8. Preparation of Charts on above topics by students.
9. Collecting and preparation of Museum specimens with dead frogs/snakes/lizards etc., and/or their skeletons.
10. Additional input on types of snake poisons and their antidotes (student activity).
11. Collection of bird feathers and submission of report on Plumology.
12. Taxidermic preparation of dead birds for Zoology Museum.
13. Map pointing of prototherian and metatherian mammals.
14. 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. Chordate Zoology, Vol. 2. Saras Publication.
3. A.J. Marshall, 1995. Textbook of zoology, Vertebrates. (The McMillan Press Ltd., UK).
4. M. Ekambaranatha Ayyar, 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.).
6. Gurdarshan Singh & H. Bhaskar, 2002. Advanced Chordate Zoology. Campus Books.
7. A.K. Sinha, S. Adhikari & B.B. Ganguly, 1978. Biology of animals. Vol. II. Chordates.
8. R.L. Kotpal, 2022. Modern textbook of zoology, Vertebrates. (Rastogi Publ., Meerut).
9. E.L. Jordan & P.S. Verma, 1998. Chordate zoology. (S. Chand & Co.).
10. G.S. Sandhu, 2005. Objective Chordate Zoology. Campus Books.
11. Sandhu, G.S. & H. Bhaskar, H. 2004. Textbook of Chordate Zoology. Campus Books.
12. Veena, 2008. Lower Chordata. (Sonali Publ.).

SEMESTER I
COURSE 2 ANIMAL DIVERSITY – II: BIOLOGY OF CHORDATES

PRACTICAL SYLLABUS

Protochordata: Herdmania, Amphioxus, Amphioxus T.S through pharynx.

Cyclostomes: Petromyzon and Myxine.

Pisces: Pristis, Torpedo, Hippocampus, Exocoetus, Echeneis, Labeo, Catla, Clarius, Channa, Anguilla.

Amphibia: Ichthyophis, Amblystoma, Axolotl larva, Hyla.

Reptilia: Draco, Chamaeleon, Uromastix, Testudo, Trionyx, Russels viper, Naja, Krait, Hydrophis, Crocodile.

Aves: Psittacula, Eudynamis, Bubo, Alcedo.

Mammalia: Ornithorhynchus, Pteropus, Funambulus.

Dissections - As per UGC guidelines Scoliodon IX and X, Cranial nerves Scoliodon Brain.

Mounting of fish scales.

Note: Dissections are to be demonstrated only by the faculty or virtual. Laboratory Record work shall be submitted at the time of practical examination.

REFERENCE WEB LINKS:

1. [https://nt7-mhe-complex-assets.mheducation.com/nt7-mhe-complex-assets/Upload-](https://nt7-mhe-complex-assets.mheducation.com/nt7-mhe-complex-assets/Upload-20190715/InspireScience6-8CA/LS15/index.html)
2. [20190715/InspireScience6-8CA/LS15/index.html](https://nt7-mhe-complex-assets.mheducation.com/nt7-mhe-complex-assets/Upload-20190715/InspireScience6-8CA/LS15/index.html)
3. <https://themammallab.com/>
4. <http://abacus.bates.edu/acad/depts/biobook/LabConCh.htm>
5. <https://virtualzoology.wordpress.com/scoliodon/>
6. [http://www.zoologyresources.com/uploadfiles/books/dc64b77d8769325515d17c945e461b45.p df](http://www.zoologyresources.com/uploadfiles/books/dc64b77d8769325515d17c945e461b45.pdf)

SEMESTER I

COURSE 2 ANIMAL DIVERSITY – II: BIOLOGY OF CHORDATES

PRACTICAL MODEL QUESTION PAPER

I. Identify the following specimens or spotters & slides, draw neat labeled diagrams– write notes on (6x5=30M):

1. Herdmania
2. Amphioxus T.S. through pharynx
3. Exocoetus
4. Hyla
5. Draco
6. Bubo

II. Dissect and draw the labeled diagram of Scoliodon IX and X, Cranial nerves (1x10=10M)

III. Viva – Voce (5M)

IV. Record (5M)

Total: 50M

SEMESTER II
COURSE 3 CELL & MOLECULAR BIOLOGY

SYLLABUS

UNIT- I Cell Biology-I

Definition, history, prokaryotic and eukaryotic cells, virus, viroids, mycoplasma. Electron microscopic structure of animal cell. Plasma membrane – Models and Fluid mosaic model. Transport functions of plasma membrane-Active – passive- facilitated.

Activity: Model preparation of cell/Assignment /Students Seminar /Quiz/Project/Peer teaching on the above.

UNIT -II Cell Biology-II

Structure and functions of Golgi complex & Endoplasmic Reticulum. Structure and functions of Lysosomes & Ribosomes. Structure and functions of Mitochondria & Centriole. Structure and functions of Nucleus & Chromosomes.

Activity: Model preparation of cell organelles/Assignment /Students Seminar /Quiz/Project/Peer teaching on the above.

UNIT – III: Cell Biology-III

Cell Division- mitosis, meiosis. Cell cycle – stages- check points- regulation. Abnormal cell growth- cancer- apoptosis. Bio energetics- Glycolysis-Krebs cycle-ETS.

Activity: Model preparation cell division /Assignment /Students Seminar /Quiz/Project/Peer teaching/Report writing after watching any video on the above.

UNIT -IV: Molecular Biology-I

Central Dogma of Molecular Biology. Basic concepts of - DNA replication – Overview (Semi-conservative mechanism, Semi- discontinuous mode, Origin & Propagation of replication fork). Transcription in prokaryotes – Initiation, Elongation and Termination, Post- transcriptional modifications (basics). Translation – Initiation, Elongation and Termination.

Activity: Model preparation of DNA/Assignment /Students Seminar /Quiz/Project/Peer teaching/Report writing after watching any video on the above.

UNIT -V: Molecular Biology-II

Gene Expression in prokaryotes (Lac Operon); Gene Expression in eukaryotes. Biomolecules- Carbohydrates (Glucose- structure-properties- biological importance only). Biomolecules- Protein (Amino acid- structure- properties- biological importance only). Biomolecules- Lipids (Fatty acid- structure - properties- biological importance only).

Activity: Assignment / Students Seminar / Quiz/Project/Peer teaching /Report writing after watching any video on the above.

SEMESTER II
COURSE 3 CELL & MOLECULAR BIOLOGY

BLUE PRINT

Time: 2 hrs | Max. Marks: 50

Unit	Essay questions	Short answer questions
I	1	1
II	1	1
III	1	2
IV	1	1
V	2	2

- Out of 6, 3 questions should be answered (3X10=30M)
- Out of 7, 4 questions should be answered (4X5=20M)

SEMESTER II
COURSE 3 CELL & MOLECULAR BIOLOGY

MODEL QUESTION PAPER

Time: 2 hrs | Max. Marks: 50

SECTION - A

Answer any THREE of the following. Choosing at least one from each part. Draw labeled diagrams wherever necessary (3x10=30)

PART- I

1. Explain the Fluid Mosaic Model of the plasma membrane and discuss its transport functions.
2. Write an essay on the structure and functions of mitochondria.
3. Explain the stages of meiosis with neat labelled diagrams.

PART- II

4. Discuss the steps of DNA replication.
5. Explain the Lac Operon model of gene regulation in prokaryotes.
6. Explain Structure and Properties of Fatty Acids.

SECTION - B

Answer any FOUR of the following: Draw labeled diagrams wherever necessary (4x5=20)

7. Virus
8. Ribosomes
9. Meiosis
10. Glycolysis
11. Initiation
12. Gene Expression
13. Amino acid- structure

SEMESTER II
COURSE 3 CELL & MOLECULAR BIOLOGY

QUESTION BANK

Essay Questions

UNIT – I: Cell Biology – I

1. Describe the structure and differences between prokaryotic and eukaryotic cells.
2. Explain the Fluid Mosaic Model of the plasma membrane and discuss its transport functions.

UNIT – II: Cell Biology – II

3. Describe the structure and functions of the Golgi complex.
4. Describe the structure and functions of Endoplasmic Reticulum
5. Write an essay on the structure and functions of mitochondria

UNIT – III: Cell Biology – III

6. Explain the stages of meiosis with neat labelled diagrams.
7. Write an essay on the cell cycle and its regulation.
8. Describe the process of glycolysis and its significance.
9. Explain Krebs cycle in respiration.

UNIT – IV: Molecular Biology – I

10. Discuss the steps of DNA replication.
11. Describe the process of transcription and translation in prokaryotes

UNIT – V: Molecular Biology – II

12. Explain the Lac Operon model of gene regulation in prokaryotes
13. Explain Structure and Properties of Fatty Acids

Short Answer Questions

UNIT I – Cell Biology I

1. Differences between prokaryotic and eukaryotic cells
2. Structure and significance of virus, viroids, and mycoplasma
3. Structure and functions of the plasma membrane
4. Active and passive transport across the plasma membrane

UNIT II – Cell Biology II

5. Structure and functions of the Golgi complex
6. Functions of Endoplasmic Reticulum
7. Structure and role of lysosomes
8. Structure and functions of ribosomes

UNIT III – Cell Biology III

9. Stages of mitosis
10. Differences between mitosis and meiosis
11. Role of checkpoints in the cell cycle
12. Apoptosis and its biological significance

UNIT IV – Molecular Biology I

13. Semi-conservative mechanism of DNA replication
14. Steps involved in transcription in prokaryotes

UNIT V – Molecular Biology II

15. Lac Operon model of gene regulation
16. Carbohydrates

REFERENCES AND PROJECTS

CO-CURRICULAR ACTIVITIES

1. Model of animal cell.
2. Working model of mitochondria to encourage creativity among students.
3. Photo album of scientists of cell biology.
4. Charts on plasma membrane models/cell organelles.
5. Charts on central dogma/lac operon/genetic code.
6. Model of semi-conservative model of DNA replication.
7. Power point presentation of any of the above topics by students.

REFERENCE BOOKS

1. Lodish, Berk, Zipursky, Matsudaria, Baltimore, Darnell, Molecular Cell Biology. Freeman and company New York.
2. Cell Biology by De Robertis.
3. Bruce Alberts, Molecular Biology of the Cell.
4. Rastogi, Cytology.
5. Varma & Aggarwal, Cell Biology.
6. C.B. Pawar, Cell Biology.
7. Molecular Biology by Frei fielder.
8. Instant Notes in Molecular Biology by Bios scientific publishers.
9. James D. Watson, Nancy H. Hopkins „Molecular Biology of the Gene“.

SEMESTER II
COURSE 3 CELL & MOLECULAR BIOLOGY

PRACTICAL SYLLABUS

1. Preparation of temporary slides of Mitotic divisions with onion root tips.
2. Observation of various stages of Mitosis with prepared slides.
3. Observation of various stages of Meiosis with prepared slides.
4. Mounting of salivary gland chromosomes of Chironomus.
5. Test for carbohydrate in given biological sample (Benedicts test).
6. Test for Protein in given biological sample (Nitric acid test -white ring).
7. Test for lipid in the given biological sample (Saponification test).

REFERENCE WEB LINKS:

1. <https://cbi-au.vlabs.ac.in/>
2. <https://www.youtube.com/watch?v=xhnUZAYNdQk>
3. https://www.youtube.com/watch?v=l8LXQq5_VL0
4. <https://www.labster.com/simulations>
5. <https://www.sciencecourseware.org/BiologyLabsOnline/protected/TranslationLab/index.php>
6. <https://virtual-labs.github.io/exp-analysis-of-carbohydrates-au/procedure.html>
7. https://www.labxchange.org/library/items/lb:LabXchange:f10fd7ad:lx_simulation:1
8. <http://www.zoologyresources.com/uploadfiles/books/dc64b77d8769325515d17c945e461b45.pdf>

SEMESTER II
COURSE 3 CELL & MOLECULAR BIOLOGY

PRACTICAL MODEL QUESTION PAPER

I. Identify the given spotter/slides and write identification points with neat labeled diagrams
(5X4=20 marks)

1. Metaphase of Mitosis
 2. Telophase of Mitosis
 3. Zygotene
 4. Diplotene
 5. Polytene chromosomes
- II. Major experiment (15M)
- III. Minor experiment (5M)
- IV. Viva – Voce (5M)
- V. Record (5M)

Total 50

SEMESTER II
COURSE 4 EMBRYOLOGY

SYLLABUS

UNIT-I:

Historical perspective and basic concepts: Phases of development. Cell-Cell interaction, Pattern formation, Differentiation and growth. Differential gene expression, Cytoplasmic determinants and asymmetric cell division.

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above.

UNIT-II:

Gametogenesis, Spermatogenesis, Oogenesis; Types of eggs, Egg membranes; Fertilization (External and Internal). Planes and patterns of cleavage; Types of Blastulae; Fate maps. Early development of frog and chick up to gastrulation.

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/Model preparation on cleavage planes.

UNIT-III:

Fate of Germ Layers. Extra-embryonic membranes. Placenta (Structure, types and functions of placenta). Amniocentesis.

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/Chart preparation on the placenta.

UNIT-IV:

Metamorphosis: Changes, hormonal regulations in amphibians. Regeneration: Modes of regeneration, epimorphosis, morphallaxis and compensatory regeneration (in Turbellarians). Ageing: Concepts and Theories. Teratogenic agents and their effects on embryonic development.

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above /Flow chart preparation on the process of metamorphosis highlighting the periodical changes vs hormone activity.

UNIT-V:

Comparative study of Gastrulation in Frog, Chick and Mammal. Induction and embryonic organizers (Spemann's experiment). Organogenesis of Skin. Organogenesis of Circulatory system (* Organogenesis in Human need to be explained).

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above /Flow chart preparation on the process of organogenesis highlighting the gradual developments of organ systems.

SEMESTER II
COURSE 4 EMBRYOLOGY

BLUE PRINT

MODULE NO.	ESSAY QUESTIONS	SHORT ANSWER QUESTIONS
Module -I	1	2
Module -II	2	1
Module -III	1	1
Module -IV	1	1
Module -V	1	2
TOTAL	6 (Answer 3)	7 (Answer 4)

SEMESTER II
COURSE 4 EMBRYOLOGY

MODEL QUESTION PAPER

Time: 2 hrs. | Max Marks: 50

SECTION –A

Answer Any THREE of the following by choosing at least one question in each part. Draw labeled diagrams wherever necessary (3X10=30 M)

PART I

1. Describe the Phases of development of Embryology.
2. Give an account of Spermatogenesis.
3. Explain Planes and Patterns of cleavage.

PART II

4. Write an essay on different types of placenta.
5. Describe metamorphosis in amphibians.
6. Explain organogenesis of Eye.

SECTION B

Answer Any FIVE of the following questions (4x5=20 Marks) *(Note: Blueprint indicates 4 to be answered)*

7. Cytoplasmic determinants
8. Phases of embryonic development
9. Extra-embryonic membranes
10. Amniocentesis
11. Teratogenic agents
12. Gastrulation in Frog
13. Ear development

SEMESTER II
COURSE 4 EMBRYOLOGY

QUESTION BANK

UNIT-I: Historical Perspective, Basic Concepts, and Early Developmental Processes

Essay Questions

1. Describe the historical development of embryology
2. Describe the Cell-Cell interaction
3. Explain differential gene expression

Short Questions

4. Define Cytoplasmic determinants
5. What is asymmetric cell division
6. Phases of embryonic development
7. Pattern formation

UNIT-II: Gametogenesis, Fertilization, Cleavage, and Gastrulation

Essay Questions

1. Give an account of gametogenesis.
2. Explain Planes and patterns of cleavage.
3. Describe fertilization process, compared to external and internal modes

Short Questions

4. Extra-embryonic membranes?
5. Define planes of cleavage.
6. List types of eggs.
7. Draw a fate map of frog embryo.

UNIT-III: Germ Layers, Extra-embryonic Membranes, Placenta, and Diagnostic Techniques

Essay Questions

1. Discuss fate of germ layers with suitable examples and diagrams.
2. Explain structure, types, and functions of placenta.
3. Illustrate the Extra-Embryonic Membranes and their functions

Short Questions

4. Derivatives of ectoderm.
5. Define placenta, and mention the functions.
6. Amniocentesis.

UNIT-IV: Metamorphosis, Regeneration, Ageing, and Teratogenesis

Essay Questions

1. Describe metamorphosis in amphibians.
2. Explain the Modes of Regeneration
3. Discuss theories of ageing and effects of teratogenic agents on development.

Short Questions

4. Name hormones in amphibian metamorphosis.
5. Define epimorphosis.
6. What is morphallaxis? Give an example.
7. Teratogenic agents.

UNIT-V: Organogenesis of Key Systems

Essay Questions

1. Describe organogenesis of central nervous system with diagrams.
2. Explain organogenesis of Eye.
3. Give an account of skin and circulatory system organogenesis.

Short Questions

4. Gastrulation in Frog
5. Ear development
6. Heart organogenesis.
7. Name layers of skin in development.

REFERENCES AND PROJECTS

CO-CURRICULAR ACTIVITIES:

1. Preparation of models of different types of eggs in animals.
2. Chart on frog embryonic development, fate map of frog blastula, cleavage etc.
3. Chart on the organogenesis.
4. RBPT on the Placenta.
5. Model of extra embryonic membrane.
6. Laboratory observation of chick embryonic development.

REFERENCES BOOKS:

1. Developmental Biology by Balinsky
2. Developmental Biology by Gerard Karp
3. Chordate embryology by Varma and Agarwal
4. Embryology by V.B. Rastogi
5. Austen CR and Short RV. 1980. Reproduction in Mammals. Cambridge University Press.
6. Gilbert SF. 2006. Developmental Biology, 8th Edition. Sinauer Associates Inc., Publishers, Sunderland, USA.
7. Longo FJ. 1987. Fertilization. Chapman & Hall, London.
8. Rastogi VB and Jayaraj MS. 1989. Developmental Biology. Kedar Anath Ram Nath Publishers, Meerut.
9. Schatten H and Schatten G. 1989. Molecular Biology of Fertilization. Academic Press, New York.

SEMESTER II
COURSE 4 EMBRYOLOGY

PRACTICAL SYLLABUS

1. Study of whole mounts and sections of developmental stages of frog through permanent slides: Cleavage stages, blastula, gastrula, neurula, tail-bud stage, tadpole (external and internal gill stages)
2. Study of whole mounts of developmental stages of chick through permanent slides: Primitive streak (13 and 18 hours), 21, 24, 28, 33, 36, 48, 72, and 96 hours of incubation (Hamilton and Hamburger stages)
3. Study of different sections of placenta (photomicrograph/ slides)
4. Project report on chick embryo development

SEMESTER II
COURSE 4 EMBRYOLOGY

PRACTICAL MODEL QUESTION PAPER

I. Project report on chick embryo development.	(12M)
II. Study of different sections of placenta	(8M)
III. Identify the following Embryology slides	(5X4=20M)
1. Embryology slide	
2. Embryology slide	
3. Embryology slide	
4. Embryology slide	
5. Embryology slide	
IV. Record	(05 M)
V. Viva	(05 M)
	Total - 50

SEMESTER II
MULTI DISCIPLINARY COURSE
PRINCIPLES OF BIOLOGICAL SCIENCES

SYLLABUS

UNIT-I Diversity of Life

1.1 Introduction to Biology, Branches of Biology, Basic Principles of Biology

1.2 Biological Classification-Two kingdom and Five kingdom classification, Viruses, Viroid's and Lichens 1.3 Diversity in the living world, Taxonomic categories, Taxonomic aids 1.4 Plant organization-The form, structure and function of plant vegetative and reproductive organs, Classification of Plant Kingdom, 1.5 Basis of Animal Classification, Classification of Animal Kingdom

UNIT-II Biomolecules and metabolism

2.1 Ultra structure of cell and Cell organelles (Structure and Functions), Plant cell vs Animal cell 2.2 Plant Physiology: Photosynthesis, Respiration, Transportation, Mechanisms of Nitrogen fixation. 2.3 Plant growth and development, physiology of flowering. 2.4 Human Physiology: Digestion, Respiration, Circulation 2.5 Male and female reproductive organs, gametogenesis, fertilization.

UNIT-III Principles of Biology

3.1 Genetics: Mendel's laws of inheritance, Genetic disorders- Colour blindness, Sickle cell anaemia. 3.2 Evolution: Geological time scale for evolution of plants and vertebrates, Origin and evolution of plants and man 3.3 Common Human Diseases: causing organism, prevention and treatment- malaria, dengue, AIDS, cancer, corona. 3.4 Common Plant Diseases: causing organism, prevention and treatment- Black spot, Leaf spots, Powdery mildew, Blight, Canker. 3.5 Biotechnology: Tools and process of recombinant DNA technology, Applications of biotechnology in agriculture, food industry, medicine and transgenic animals

SEMESTER II

MULTI DISCIPLINARY COURSE: PRINCIPLES OF BIOLOGICAL SCIENCES

BLUE PRINT

MODULE	ESSAY QUESTIONS	SHORT ANSWER QUESTIONS	MARKS ALLOTED
MODULE – I	1	2	20
MODULE – II	2	2	30
MODULE – III	2	3	35
Total	5 (Answer 3)	7 (Answer 4)	50 Marks to be answered

SEMESTER II
MULTI DISCIPLINARY COURSE
PRINCIPLES OF BIOLOGICAL SCIENCES

MODEL QUESTION PAPER

Time: 2 hrs. | Max.Marks: 50

SECTION- A

Answer any THREE of the following questions (3X10=30)

1. Write an overview on five kingdom classification?
2. Discuss the ultrastructure of a cell and the functions of cell organelles. Compare the structure of plant cells and animal cells?
3. Explain the physiology of photosynthesis, respiration, and transportation in plants.
4. Discuss Mendel's laws of inheritance and their significance in understanding genetic traits.
5. Examine common plant diseases. Describe the causal preventive measures, and treatment methods.

SECTION- B

Answer any FOUR of the following questions (4X5=20)

6. Viroid
7. Plant Reproductive organs
8. Plant cell structure
9. Fertilization
10. Geological time scale
11. Applications of Biotechnology
12. Photosynthesis

REFERENCES AND PROJECTS

Text Books

1. Pandey, B.P. (2013) College Botany, Volume-I, S. Chand Publishing, New Delhi.
2. Kotpal, R.L.2022. Modern textbook of zoology, Vertebrates. (Rastogi Publ., Meerut).
3. Verma P.S., Agarwal V.K., 2006. Cell biology, genetics, Molecular Biology, Evolution and Ecology. S. Chand publishers, New Delhi, India.

Reference Books

4. Sreekrishna V. 2005. Biotechnology –I, Cell Biology and Genetics. New Age International Publ. New Delhi, India.
5. Rastogi, S.C., 2019. Essentials of animal physiology. 4th Edition. New Age International Publishers.

SEMESTER II
MULTI DISCIPLINARY COURSE
PRINCIPLES OF BIOLOGICAL SCIENCES

QUESTION BANK

SECTION – A

ESSAY QUESTIONS – 10 MARKS

1. Write an overview on five kingdom classification.
2. Discuss the ultrastructure of a cell and the functions of cell organelles. Compare the structure of plant cells and animal cells.
3. Explain the physiology of photosynthesis, respiration, and transportation in plants.
4. Discuss Mendel's laws of inheritance and their significance in understanding genetic traits.
5. Examine common plant diseases. Describe the causal organisms, preventive measures, and treatment methods.
6. Explain the basic principles of biology and describe the major branches of biology.
7. Describe the classification of the Plant Kingdom and explain the basis of classification.
8. Explain the basis of animal classification and give an account of the major groups of the Animal Kingdom.
9. Describe the mechanisms of nitrogen fixation and explain their significance in plant growth and development.
10. Explain human digestion, respiration, and circulation with suitable details.

SECTION – B

SHORT ANSWER QUESTIONS – 5 MARKS

11. Viroid
12. Plant Reproductive organs
13. Plant cell structure
14. Fertilization
15. Geological time scale
16. Applications of Biotechnology
17. Photosynthesis
18. Lichens
19. Taxonomic categories and taxonomic aids
20. Viruses
21. Male and female reproductive organs
22. Gametogenesis
23. Genetic disorders – Colour blindness and Sickle cell anaemia
24. Common human diseases – Malaria, Dengue, AIDS, Cancer and Corona

SEMESTER III
COURSE 5 GENETICS

SYLLABUS

UNIT-I:

1.1 History of Genetics- Concepts of Phenotype, Genotype, Heredity, Variation, Pure lines and Inbreed Lines.

1.2 Mendelian Principles on Monohybrid cross, back cross and Test cross.

1.3 Mendelian Principles on Dihybrid cross.

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/Problem solving on Mendelian principles.

UNIT-II:

2.1 Linkage - Definition, Types of linkage-complete linkage and incomplete linkage, Significance of linkage.

2.2 Crossing over - definition; Mechanism of crossing over: Chiasma Interference and coincidence.

2.4 Gene Interactions: Incomplete dominance, codominance, Pleiotropy.

2.5 Gene Interactions: Lethal alleles, Epistasis, Non- Epistasis.

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/Model preparation of linkage/crossing over.

UNIT-III:

3.1 Polygenes (General Characteristics & examples).

3.2 Multiple Alleles (General Characteristics and Blood group inheritance).

3.3 Rh inheritance erythroblastosis foetalis.

3.4 Extra chromosomal inheritance- Kappa particles in Paramecium and Shell coiling in snails.

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/Case study on Rh/Erythroblastosis foetalis.

UNIT-IV:

4.1 Sex determination- Chromosomal theory and Genic Balance theory.

4.2 Sex determination- Hormonal, Environmental and Haplo-diploidy types.

4.3 Sex linked inheritance: X-linked inheritance.

4.4 Sex linked inheritance: Y-linked & XY-linked inheritance.

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/ Preparation of animated model /chart on sex determination methods.

UNIT-V:

5.1 Human karyotyping, Pedigree Analysis(basics).

5.2 Autosomal Recessive disorder-Sickle cell anaemia – causes, treatment, inheritance pattern, modes of testing and prevention.

5.3 Autosomal Dominant disorder- Huntington disease.

5.4 Basics on Genomics and Proteomic.

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/ Case study of a family for pedigree analysis.

SEMESTER III
COURSE 5 GENETICS

BLUE PRINT

Time: 2 hrs | Max.Marks:50

Unit	Essay	Short	Marks allotted
I	1	1	15
II	2	2	30
III	1	2	20
IV	1	1	15
V	1	1	15
Total	6 (Answer 3)	7 (Answer 4)	Total: 50 Marks

SEMESTER III
COURSE 5 GENETICS

MODEL QUESTION PAPER

Time: 2hrs | Max.Marks:50

SECTION-A

I. Answer any THREE of the following. Choosing at least one from each part. Draw labelled diagrams wherever necessary (3x10=30)

PART- I

1. Explain the Mendelian principle behind the Di hybrid cross?
2. What is crossing over? Explain the mechanism of crossing over in chromosomes?
3. What is epistasis? Explain epistasis with a suitable example?

PART-II

4. What is extra chromosomal inheritance? Explain the inheritance of kappa particles in Paramecium?
5. What is Haemophilia? Explain how it is inherited among the family members?
6. Write an essay on the basics of Genomics and Proteomics?

SECTION-B

II. Answer any FOUR of the following: Draw labelled diagrams wherever necessary (4x5=20 M)

7. Mono hybrid Cross
8. Types of Linkage
9. Incomplete Dominance
10. Multiple Alleles
11. Erythroblastosis fetalis
12. Haplo-diploidy
13. Sickle Cell Anaemia

SEMESTER III
COURSE 5 GENETICS

QUESTION BANK

UNIT-I

Essay questions

1. Explain about Mendelian monohybrid cross.
2. Describe about Mendelian dihybrid cross.
3. Explain about pure lines and inbreed lines.

Short Questions

4. Variation.
5. Test cross.
6. Backcross.

UNIT-II

Essay questions

1. Write about linkage and explain types of linkages.
2. Describe about crossing over.
3. Explain about Epistasis.

Short Questions

4. Incomplete dominance.
5. Codominance.
6. Pleiotropy.
7. Lethal alleles.

UNIT-III

Essay questions

1. Write about Extra chromosomal inheritance- Kappa particles in Paramecium.
2. Explain Rh inheritance Erythroblastosis foetalis.

Short Questions

3. Polygenes (General Characteristics).
4. Multiple Alleles (General Characteristics).

UNIT-IV

Essay questions

1. Explain Sex linked inheritance: X-linked inheritance.
2. Explain Chromosomal theory and Genic Balance theory.
3. Write Sex determination- Hormonal, Environmental.

Short Questions

4. Y-linked inheritance.
5. Haplo-diploidy types sex determination.

UNIT-V

Essay questions

1. Write about Human karyotyping.
2. Explain about Basics on Genomics and Proteomics.

Short Questions

3. Huntington disease.
4. Sickle cell anaemia.
5. Pedigree Analysis.

REFERENCES AND PROJECTS

Co-curricular activities

- 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.
- Karyotyping and preparation of pedigree charts for identifying diseases in family history.
- Charts on chromosomal disorders.

REFERENCE BOOKS:

1. Harper, P. (2010). Practical genetic counselling. CRC Press.
2. Kessler, S. (Ed.). (2013). Genetic counselling: psychological dimensions. Academic Press.
3. Stevenson, A. C., & Davison, B. C. (2016). Genetic counselling. Elsevier.
4. Evans, C. (2006). Genetic counselling: a psychological approach. Cambridge University Press.
5. Atlas of Inherited Metabolic Diseases.
6. Mendelian Inheritance in Man: A Catalog of Human Genes and Genetic Disorders, Victor A. McKusick, 2 Vol I & II.
7. Stacy L Blachford (Editor) 2001. The Gale Encyclopedia of Genetic Disorders. Gale Group Publishers, Vol.1 (A-L), Vol.II (M-Z).
8. Limoine, W.R. and Cooper, D.NB. 1996: Gene Trophy, Bios Scientific Pub.Oxford.
9. Gardner, E.J., Simmons, M.J., Snustad, D.P. (2008). Principles of Genetics. VIII Edition. Wiley India.
10. Snustad, D.P., Simmons, M.J. (2009). Principles of Genetics. V Edition. John Wiley and Sons Inc.
11. Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics. X Edition. Benjamin Cummings.
12. Russell, P. J. (2009). Genetics- A Molecular Approach. III Edition. Benjamin Cummings.
13. Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B. Introduction to Genetic Analysis. IX Edition. W. H. Freeman and Co.
14. James D. Watson, Nancy H. Hopkins 'Molecular Biology of the Gene'
15. Gupta P.K., 'Genetics

SEMESTER III
COURSE 5 GENETICS

PRACTICAL 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 Ultra sonography (Virtual lab).
8. Scoring dysmorphic features in syndromic patients.
9. Genetic Counselling methods based on case history.
10. Construction and analysis of Pedigree.

REFERENCE 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/labmanual/agriculture/Fundamentals%20of%20Genetics.pdf>

https://academicworks.cuny.edu/cgi/viewcontent.cgi?article=1008&context=ny_oers

<https://sice.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

SEMESTER III
COURSE 5 GENETICS

PRACTICAL MODEL QUESTION PAPER

Time: 3Hrs | MaxMarks: 50

- I. Determination of human Blood Groups (10M)
- II. Problems on Mendelian inheritance (2X5=10M)
- III. Identification of syndromes (4x5=20M)
 - A. Patau Syndrome
 - B. Klinefelter Syndrome
 - C. Turners Syndrome
 - D. Down Syndrome
- IV. Record (5M)
- V. Viva (5M)

SEMESTER III
COURSE 6 EVOLUTION & ZOOGEOGRAPHY

SYLLABUS

UNIT-I

- 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, present day atmosphere, evolution of eukaryotes.
- 1.4 Experimental evidences in support of Biochemical origin of life (Miller and Urey experiment)

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

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)

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

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

SEMESTER III
COURSE 6 EVOLUTION & ZOOGEOGRAPHY

BLUE PRINT

Time: 2 1/2 hrs | Max. Marks: 50

Unit	Essay	Short	Marks allotted
I	1	1	15
II	2	1	30
III	1	2	20
IV	1	2	15
V	1	1	15
Total	6 (Answer 3)	7 (Answer 4)	Total: 50 Marks

- Out of 6, 3 questions should be answered (3X10=30M)
- Out of 7, 4 questions should be answered (4X5=20M)

SEMESTER III
COURSE 6 EVOLUTION & ZOOGEOGRAPHY

MODEL QUESTION PAPER

Time: 2 hrs | Max. Marks :50

SECTION- A

Note: Answer any THREE questions choosing at least one question from each section. Draw the diagrams wherever necessary (3 X10 = 30)

PART – I

1. What is evolution? Write an essay on the primordial atmosphere of earth and the origin of life in earth.
2. Discuss the Palaeontological and taxonomical evidences in support of evolution.
3. Write an essay on the Morphological and anatomical evidences in support of evolution.

Part – II

4. Explain the modern synthetic theory of Evolution.
5. What is Isolation? Explain the various isolation mechanisms leading to evolution of new species.
6. Write in detail the fauna of Oriental and Australian Regions.

SECTION-B

II. Answer any Four of the following. (4x5=20)

7. Miller and Urey experiment
8. Connecting links and Missing Links
9. Germplasm Theory
10. Theory of Natural Selection
11. Mutations
12. Hardy-Weinberg principle
13. Barriers of Animal Distribution

SEMESTER III
COURSE 6 EVOLUTION & ZOOGEOGRAPHY

QUESTION BANK

I. ESSAY TYPE QUESTIONS

1. What is evolution? Write an essay on the primordial atmosphere of earth and the origin of life in earth.
2. Describe the Miller and Urey experiment in support of Biochemical origin of life.
3. Discuss the Palaeontological and taxonomical evidences in support of evolution.
4. Write an essay on the Morphological and anatomical evidences in support of evolution.
5. Write an essay on embryological and physiological evidences of evolution.
6. Explain in detail Darwin's theory related to origin of species by natural selection.
7. Explain the modern synthetic theory of Evolution.
8. What are mutations? Explain the types of mutations, their causes and significance in evolution.
9. What is Isolation? Explain the various isolation mechanisms leading to evolution of new species.
10. Write in detail the fauna of Oriental and Australian Regions.

II. SHORT ANSWER TYPE

1. Miller and Urey experiment
2. Coacervates
3. Primitive atmosphere
4. Homologous Organs
5. Analogous Organs
6. Palaeontological evidences
7. Embryological Evidences
8. Theory of recapitulation
9. Connecting links
10. Missing Links
11. Lamarckism
12. Germplasm Theory
13. Theory of Natural Selection
14. Variations
15. Sewall Wright Effect
16. Mutations
17. Hardy-Weinberg principle
18. Barriers of Animal Distribution
19. Oriental Region
20. Australian Region
21. Ethiopian Region

REFERENCES AND PROJECTS

REFERENCES BOOKS:

1. Ridley, M. (2004). Evolution. III Edition. Blackwell Publishing.
2. Hall, B. K. and Hallgrímsson, B. (2008). Evolution. IV Edition. Jones and Bartlett Publishers.
3. Douglas, J. Futuyma (1997). Evolutionary Biology. Sinauer Associates.
4. Minkoff, E. (1983). Evolutionary Biology. Addison-Wesley.

5. Organic evolution by Dr. Veer Bala Rastogi, 2019 Kedar Nath Ramnath.
6. Palaeontology and Zoogeography. Organic evolution by Dr. Veer Bala Rastogi, 2019 Kedarnath.
7. Ramnath Rastogi VB. 1991. Organic Evolution. Kedar Nath Ram Nath Publications, Meerut.
8. Stahl FW. 1965. Mechanics of Inheritance. Prentice-Hall.
9. White MJD. 1973. Animal Cytology and Evolution. Cambridge Univ.Press.

SEMESTER III
COURSE 6 EVOLUTION & ZOOGEOGRAPHY

PRACTICAL 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 Lamarkism 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

REFERENCE WEB LINKS:

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

SEMESTER III
COURSE 6 EVOLUTION & ZOOGEOGRAPHY

PRACTICAL MODEL QUESTION PAPER

Time: 2hrs | Max Marks: 50

1. Discuss Homology & Analogy with suitable examples (10M)
2. Embryological evidences/Lamarckism/Darwinism with examples (10M)
3. Connecting links/Missing links Identification with their salient features (10M)
4. Genetic Drift with Darwin's Finches as examples OR Mapping distribution of animals according to Zoogeographical regions (10M)
5. Record (05M)
6. Viva (05M)

SEMESTER III
COURSE 7 ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS

SYLLABUS

UNIT-I: Physiology of Digestion

Structural organization and functions of gastrointestinal tract and associated glands; Vitamins & Mineral composition of food & Mechanical and chemical digestion of food; Absorptions of carbohydrates, lipids, proteins, water, minerals and vitamins; Hormonal control of secretion of enzymes in Gastrointestinal tract.

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above /Chart preparation on the hormonal control of secretion of enzymes.

UNIT-II: Physiology of Respiration

Structural organization of Respiratory system, Mechanism of respiration, Control of respiration. Pulmonary ventilation; Respiratory volumes and capacities; Transport of oxygen in blood and dissociation curves and the factors influencing it. Transport of Carbon dioxide in blood; dissociation curves and the factors influencing it, Carbon monoxide poisoning.

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above /Group discussion on the CO poisoning/Debate on the dissociation curves.

UNIT-III: Renal Physiology

Structure of kidney and its functional UNIT. Mechanism of urine formation. Regulation of water balance. Regulation of acid-base balance.

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above /Group discussion on the Urine formation/Working model of Kidney.

UNIT-IV: Physiology of exciting tissues

Neuron structure and types. Nerve impulse transmission-(Myelinated, Non-myelinated, synaptic). Ultra structure of muscle. Molecular and chemical basis of muscle contraction.

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above /Group discussion on the impulse transmission.

UNIT- V: Physiology of Heart

Structure of mammalian heart, Coronary circulation; Structure and working of conducting myocardial fibers. Origin and conduction of cardiac impulses. Cardiac Cycle-Cardiac output and its regulation. Nervous and chemical regulation of heart rate. Blood pressure and its regulation.

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above /Group discussion on the phases of Cardiac output/case study on the Blood Pressure.

SEMESTER III
COURSE 7 ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS

BLUE PRINT

MODULE NO.	ESSAY QUESTIONS	SHORT ANSWER QUESTIONS	MARKS ALLOTTED
Module-I	1	2	20
Module-II	1	2	20
Module-III	2	1	25
Module-IV	1	1	15
Module-V	1	1	15
Total	6 (Answer 3)	7 (Answer 5)	50 Marks to be answered
(Note: Answer 4 short questions for 20 marks usually, per generic guidelines)			

SEMESTER III
COURSE 7 ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS

MODEL QUESTION PAPER

Time: 2 hrs. | Max.Marks:50

SECTION-A

I. Answer any THREE questions choosing at least one question from each part. Draw diagrams wherever necessary (3X10= 30 M)

PART- 1

1. Write an essay on the process of absorption of food materials.
2. Elucidate the transport of Oxygen through lungs.
3. Discuss about the urine formation Mechanism.

Part- II

4. Describe the structure and factions of kidney.
5. Discuss the Process of Muscle contraction.
6. Write an essay on cardiac cycle.

SECTION-B

Answer any FOUR of the following. (4x5=20 M)

7. Chemical digestion of food.
8. Gastro intestinal tract associated glands.
9. Pulmonary ventilation.
10. Respiratory volumes and capacities.
11. Regulation of acid-base balance.
12. Structure of Neuron.
13. Blood pressure and its regulation.

SEMESTER III
COURSE 7 ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS

QUESTION BANK

UNIT: I

ESSAY QUESTIONS

1. Write an essay on Structural organization and functions of gastro intestinal tract and associated glands.
2. Write an essay on the process of Absorptions.
3. Discuss about Hormonal control of different Types of enzymes in Gastro intestinal tract.
4. Elucidate the Mechanical and chemical digestion of food.

Short Answer questions

5. Vitamins & Mineral composition of food.
6. Absorptions.
7. Gastro intestinal tract associated glands.
8. Mechanical digestion of food.

UNIT: II

ESSAY QUESTIONS

1. Elucidate the transport of O₂ in blood; dissociation curves and the factors influencing it.
2. Elucidate the Transport of Carbon dioxide in blood and the factors influencing it.
3. Write an essay on Mechanism of respiration and control of respiration.

UNIT: III

ESSAY QUESTIONS

1. Discuss about the mechanism of urine formation.
2. Describe the structural and functional unit of kidney.
3. Describe the structure and functions of Kidney.
4. Discuss about the Regulation of water and acid-base balance.

Shorts Answer questions

5. Kidney structure
6. Counter current Mechanism.
7. Regulation of water balance
8. Regulation of acid-base balance

UNIT: IV

ESSAY QUESTIONS

1. Discuss about the Process of Muscle contraction.
2. Write an essay on structure and types of Neuron.
3. Describe the Ultrastructure of muscle.

Shorts Answer questions

4. Nerve impulse transmission.
5. Neuron structure.
6. Myelinated and non-myelinated sheath.
7. Neuro transmitters.

UNIT: V

ESSAY QUESTIONS

1. Write an essay on cardiac cycle.
2. Elucidate the Structure of mammalian heart.
3. Describe the Structure and working of heart.

Shorts Answer questions

4. Structure of heart.
5. Myogenic heart.
6. Neuro genic heart.
7. Blood pressure and its regulation.

REFERENCES AND PROJECTS

CO-CURRICULAR ACTIVITIES:

1. Chart on cardiac cycle, human lung, kidney/nephron structure etc.
2. Working model of human / any mammalian heart.
3. Working model of human / any mammalian urine formation.
4. Chart/model of sarcomere.
5. Chart/model on nerve impulse transmission.

REFERENCES BOOKS:

1. Eckert H. Animal Physiology: Mechanisms and Adaptation. W.H. Freeman & Company.
2. Flory E. An Introduction to General and Comparative Animal Physiology. W.B. Saunders Co., Philadelphia.
3. Goel KA and Satish KV. 1989. A Text Book of Animal Physiology, Rastogi Publications, Meerut, U.P.
4. Hoar WS. General and Comparative Physiology. Prentice Hall of India, New Delhi.
5. Lehninger AL. Nelson and Cox. Principles of Biochemistry. Lange Medical Publications, New Delhi.
6. Prosser CL and Brown FA. Comparative Animal Physiology. W.B. Saunders Company, Philadelphia.

Additional Inputs:

1. Classification of animals based on Feeding habits
2. Excretory Products.
3. Structure and types of Neurons
4. Types of muscles
5. Blood Pressure

SEMESTER III
COURSE 7 ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS

PRACTICAL SYLLABUS

1. Examination of sections of mammalian esophagus, stomach, duodenum, ileum, rectum liver, trachea, lung, kidney
2. Study of activity of Salivary amylase under optimum condition
3. Qualitative tests for identification of Carbohydrates
4. Qualitative tests for identification of Proteins
5. Qualitative tests for identification of Fats
6. Urine test for sugar, albumin
7. Estimation of hemoglobin using Sahli's haemoglobinometer
8. Recording of blood pressure using a sphygmomanometer
9. Recording of frog's heart beat under insitu and perfused conditions
10. ECG observation-Spotting/identification of curves from the given ECG

REFERENCE WEB LINKS:

<https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham>
<https://library.csi.cuny.edu/oer/virtuallabs-simulations#anatomy>
<https://www.labster.com/simulations?course-packages=animal-physiology>
<http://www.zoologyresources.com/uploadfiles/books/dc64b77d8769325515d17c945e461b45.pdf> [https://physiology.elte.hu/gyakorlat/jegyzet/Physiology_Pactical_\(2013\).pdf](https://physiology.elte.hu/gyakorlat/jegyzet/Physiology_Pactical_(2013).pdf)

SEMESTER III
COURSE 7 ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS

PRACTICAL MODEL QUESTION PAPER

I. Demonstrate and write procedures for the following Questions

1. Estimation of the salivary Amylase Activity. (12M)

2. Identification of Proteins (Any Four). (8M)

II. Identify the following write notes and draw diagram (5X4=20M)

3. Kidney

4. Lung

5. Liver

6. Stomach

III. Record (05M)

IV. Viva (05M)

Total: 50M

SEMESTER-III
MULTIDISCIPLINARY COURSE
HEALTH AND HYGIENE

SYLLABUS

Credits:2

2 hrs/week

Unit I: Basics of Nutrition 10 Hrs.

1. Nutrition – definition, importance, good nutrition and mal nutrition; Balanced Diet: Basics of Meal Planning
2. Carbohydrates –functions, dietary sources, effects of deficiency.
3. Lipids –functions, dietary sources, effects of deficiency.
4. Proteins –functions, dietary sources, effects of deficiency.
5. Brief account of Vitamins- functions, food sources, effects of deficiency,
6. Macro and micro minerals –functions, effects of deficiency; food sources of Calcium, Potassium and Sodium; food sources of Iron, Iodine and Zinc
7. Importance of water– functions, sources, requirement and effects of deficiency.

Unit II: Health 10 Hrs.

8. Health - Determinants of health, Key Health Indicators, Environment health & Public health; Health-Education: Principles and Strategies
9. Health Policy & Health Organizations: Health Indicators and National Health Policy of Govt. of India-2017; Functioning of various nutrition and health organizations in India viz., NIN (National Institution of Nutrition), FNB (Food and Nutrition Board), ICMR (Indian Council of Medical Research), IDA (Indian Dietetics Association), WHO-India, UNICEF-India
10. National Health Mission: National Rural Health Mission (NRHM) Framework, National Urban Health Mission (NUHM) Framework
11. Women & Child Health Care Schemes: Reproductive, Maternal, Newborn, Child and Adolescent Health (RMNCH+); Janani Shishu Suraksha Karyakaram (JSSK); Rashtriya Bal Swasthya Karyakram (RBSK); India Newborn Action Plan (INAP); Adolescent Health- Rashtriya Kishor Swasthya Karyakram (RKSK)
12. Disaster Management – Containment, Control and Prevention of Epidemics and Pandemics – Acts, Guidelines and Role of Government and Public

Unit III: Hygiene 10 Hrs.

13. Hygiene – Definition; Personal, Community, Medical and Culinary hygiene; WASH (Water, Sanitation and Hygiene) programme
14. Rural Community Health: Village health sanitation & Nutritional committee (Roles & Responsibilities); About Accredited Social Health Activist (ASHA); Village Health Nutrition Day, Rogi Kalyan Samitis
15. Community & Personal Hygiene: Environmental Sanitation and Sanitation in Public places
16. Public Awareness through Digital Media - An Introduction to Mobile Apps of Government of India: NHP, Swasth Bharat, No More Tension, Pradhan Mantri Surakshit Mantritva Abhiyan (PM Suman Yojana), My Hospital (Mera aspataal), India fights Dengue, JSK Helpline, Ayushman Bhava, Arogya Setu, Covid 19AP

REFERENCES

- Bamji, M.S., K. Krishnaswamy & G.N.V. Brahman (2009)
Textbook of Human Nutrition(3rd edition) Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi
Swaminathan (1995) Food & Nutrition (Vol I, Second Edition) The Bangalore Printing & Publishing Co Ltd., , Bangalore
Vijaya Khader (2000) Food, nutrition & health, Kalyan Publishers, New Delhi Srilakshmi, B., (2010) Food Science, (5th Edition) New Age International Ltd., New Del

SEMESTER-III
MULTIDISCIPLINARY COURSE
HEALTH AND HYGIENE

MODEL PAPER

Time: 2 Hours Maximum Marks: 50

Section-A

I. Answer any THREE questions. Choosing at least 1 question from each part $3 \times 10 = 30$ Marks

PART I

1. Explain the functions, dietary sources and deficiency effects of carbohydrates, lipids and proteins.
2. Discuss the National Health Mission frameworks – NRHM and NUHM – and their key objectives.
3. Describe the types of Hygiene and elaborate on the WASH programme.

PART II

4. Give a detailed account of vitamins – their functions, sources and deficiency disorders.
5. Write an essay on the Women and Child Health Care Schemes in India.
6. Explain the role of digital media and important mobile apps of Government of India in creating public awareness of health and hygiene.

Section-B

II. Answer any Four questions. $4 \times 5 = 20$ Marks

7. Define balanced diet. What are the basics of meal planning?
8. Write the functions and deficiency effects of iron, iodine and zinc.
9. List the key health indicators and determinants of health.
10. Briefly describe the functioning of NIN and ICMR.
11. What are the roles and responsibilities of Village Health Sanitation & Nutritional Committee?
12. Write short notes on environmental sanitation and sanitation in public places.
13. Explain the role of an Accredited Social Health Activist (ASHA) in rural health.

SEMESTER-III
MULTIDISCIPLINARY COURSE
HEALTH AND HYGIENE

QUESTION BANK

MODULE – I: BASICS OF NUTRITION

A. ESSAY QUESTIONS – 10 MARKS

1. Explain the functions, dietary sources and deficiency effects of carbohydrates, lipids and proteins.
2. Define Nutrition and explain good nutrition, malnutrition and balanced diet.
3. Give a detailed account of vitamins – their functions, sources and deficiency disorders.
4. Explain macro-minerals and micro-minerals.

B. SHORT ANSWER QUESTIONS – 5 MARKS

1. Define balanced diet. What are the basics of meal planning?
2. Write the functions and deficiency effects of iron, iodine and zinc.
3. Write a short note on Kwashiorkor and Marasmus.
4. What are RDA and RDI? Explain their significance.

MODULE – II: HEALTH, HEALTH POLICY AND HEALTH PROGRAMMES

A. ESSAY QUESTIONS – 10 MARKS

1. Discuss the National Health Mission frameworks – NRHM and NUHM – and their key objectives.
2. Write a detailed account of the National Health Policy, 2017, including its goal, objectives, health-status goals, health-system performance and policy thrust.
3. Write an essay on the Women and Child Health Care Schemes in India.
4. Explain Health Education, its principles, roles, strategies and purposes.

B. SHORT ANSWER QUESTIONS – 5 MARKS

1. List the key health indicators and determinants of health.
2. Briefly describe the functioning of NIN and ICMR.
3. Write a short note on Health Education – principles, roles and strategies.
4. Write a short note on the Rashtriya Bal Swasthya Karyakram (RBSK) and its 4 Ds.

MODULE – III: HYGIENE, SANITATION, COMMUNITY HEALTH AND DIGITAL HEALTH

A. ESSAY QUESTIONS – 10 MARKS

1. Describe the types of Hygiene and elaborate on the WASH programme.
2. Explain the role of digital media and important mobile apps of Government of India in creating public awareness of health and hygiene.
3. Define environmental sanitation and explain the basic rules for sanitation in public places.
4. Explain the roles and responsibilities of the Village Health, Sanitation and Nutrition Committee (VHSNC).

B. SHORT ANSWER QUESTIONS – 5 MARKS

1. Write short notes on environmental sanitation and sanitation in public places.
2. Explain the role of an Accredited Social Health Activist (ASHA) in rural health.
3. Explain the Village Health and Nutrition Day (VHND) and mention its major activities.
4. What are epidemics and pandemics? Briefly explain the measures for their prevention and control.

SEMESTER IV
COURSE 8 IMMUNOLOGY

SYLLABUS

UNIT – I: Overview of Immune system

- 1.1 Introduction to basic concepts in Immunology
- 1.2 Innate and adaptive immunity
- 1.3 Cells of immune system
- 1.4 Organs of immune system

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/Model chart preparation of cells/organs of immune system.

UNIT – II : Antigens

- 2.1 Basic properties of antigens
- 2.2 B and T cell epitopes, paratopes
- 2.3 Haptens and adjuvants
- 2.4 Factors influencing immunogenicity

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/ Model chart preparation of organogenesis.

UNIT – III: Antibodies

- 3.1 Structure of antibody
- 3.2 Classes of antibodies
- 3.3 Functions of antibodies
- 3.4 Monoclonal antibodies

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/ Model chart preparation of antibodies.

UNIT – IV: Working of Immune system

- 4.1 Structure and functions of major histocompatibility complexes
- 4.2 Exogenous pathway of antigen presentation and processing
- 4.3 Endogenous pathway of antigen presentation and processing
- 4.4 Basic properties and functions of cytokines

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/ Model chart preparation of MHC.

UNIT – V: Immune system in health and disease

- 5.1 Gell and Coombs' classification and brief description of various types of hypersensitivities
- 5.2 Introduction to concepts of autoimmunity and immunodeficiency
- 5.3 General introduction to vaccines Types of vaccines, Immunization programme
- 5.4 Organ transplantation- Graft rejection, immune suppressors

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/ Model chart preparation of classification of Hypersensitivity.

Additional inputs:

- Autoimmune disorders
- Immunodeficiency disorders, Anti-venom

SEMESTER IV
COURSE 8 IMMUNOLOGY

BLUE PRINT

Time: 2 hrs | Max. Marks: 50

Unit	Essay 10M	Short 5M	Marks allotted
I	1	1	15
II	1	1	15
III	1	2	20
IV	2	2	30
V	1	1	15
Total	6 (Answer 3)	7 (Answer 4)	50 Marks to be answered

SEMESTER IV
COURSE 8 IMMUNOLOGY

MODEL QUESTION PAPER

Time: 3hrs | Max. Marks: 50

SECTION – A

I. Answer any THREE of the following, choosing at least one from each part. Draw labelled diagrams wherever necessary. ($3 \times 10 = 30$ M)

PART – I

1. Explain the components of the immune system and differentiate between innate and adaptive immunity.
2. Describe the properties and types of antigens.
3. Explain the structure and functions of different classes of antibodies.

PART – II

4. Explain the structure and functions of MHC molecules.
5. Describe the hypersensitivity reactions as per Gell and Coombs classification.
6. Write an essay on vaccines and immunization programmes in India.

SECTION – B

II. Answer any FOUR of the following. ($4 \times 5 = 20$ M)

7. Secondary Lymphoid organs
8. Epitopes and haptens
9. Monoclonal antibodies
10. Exogenous pathway
11. Autoimmunity — causes and examples
12. Immunodeficiency disorders
13. Graft rejection mechanisms

SEMESTER IV
COURSE 8 IMMUNOLOGY

QUESTION BANK

Essay Questions (10M each)

1. Explain the components of the immune system and differentiate between innate and adaptive immunity.
2. Describe the properties and types of antigens with examples.
3. Explain the structure and functions of different classes of antibodies.
4. Describe the structure and functions of lymphoid organs.
5. Explain the structure, classes, and role of MHC molecules.
6. Describe antigen processing and presentation through exogenous and endogenous pathways.
7. Classify hypersensitivity reactions and explain any two types.
8. Discuss autoimmunity and immunodeficiency disorders with examples.
9. Write an essay on vaccines and immunization programmes in India.
10. Explain the types, causes, and mechanisms of graft rejection.

Short Answer Questions (5M each)

1. Innate immunity.
2. Adaptive immunity.
3. Epitopes and haptens.
4. Factors affecting immunogenicity.
5. Hybridoma technology.
6. Monoclonal antibodies – production and uses.
7. Structure of IgG.
8. Complement system – classical pathway.
9. Functions of macrophages.
10. Cytokines – types and roles.
11. Immunological memory.
12. Examples of autoimmune diseases.
13. SCID and AIDS (brief note).
14. Live attenuated vaccines.
15. Types of grafts in transplantation.

REFERENCES AND PROJECTS

Co-curricular activities

- 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.

REFERENCES BOOKS:

1. Judy Owen, Jenni Punt, Sharon Stranford 2013 Kuby Immunology: International Edition W. H. Freeman.
2. Abbas AK, 2011, Cellular and Molecular Immunology 7th Ed. Elsevier Health Sciences – India.
3. Delves P, Martin S, Burton D, Roitt IM 2011 Roitt's Essential Immunology. 12th Ed. Wiley-Blackwell Scientific Publication, Oxford.
4. Murphy K, 2011 Janeway's Immunobiology. 8th Ed. Garland Science Publishers, New York.

5. Peakman M, and Vergani D. (2009). Basic and Clinical Immunology. 2nd edition Churchill Livingstone Publishers, Edinberg.
6. Richard Coico, Geoffrey Sunshine 2008 Immunology: A Short Course, 6th Edition Wiley-Blackwell.
7. Sudha Gangal 2013 Textbook of Basic and Clinical Immunology Orient Blackswan Private Limited - New Delhi.

SEMESTER IV
COURSE 8 IMMUNOLOGY

PRACTICAL SYLLABUS

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 ELISA.
5. Demonstration of Immuno electrophoresis.
6. Testing for Typhoid antigens by Widal test.
7. Differential Leukocyte Count.
8. Isolation of monocytes from blood.
9. Rapid Plasma Reagin (RPR) Test.

REFERENCE WEB LINKS:

1. <https://vlab.amrita.edu/?sub=3&brch=69>
2. <https://ivl1-au.vlabs.ac.in/List%20of%20experiments.html>
3. <https://ivl2-au.vlabs.ac.in/List%20of%20experiments.html>
4. <https://www.medicine.mcgill.ca/physio/vlab/immun/vlabmenuimmun.htm>
5. <http://www.zoologyresources.com/uploadfiles/books/dc64b77d8769325515d17c945e461b45.pdf>
6. [http://www.lucp.net/books-pdf/Lab%20Manual%20Dr.%20Idris%20Adewale%20Ahmed/15.%20BASIC%20IMMUNOLOGY](http://www.lucp.net/books-pdf/Lab%20Manual%20Dr.%20Idris%20Adewale%20Ahmed/15.%20BASIC%20IMMUNOLOGY.pdf)
7. [.pdf](#)
8. https://www.avit.ac.in/lab/immunology_bioprocess_engineering_lab/download/17BTCC89/lab_manual.pdf
9. [https://www.urmc.rochester.edu/MediaLibraries/URMCMedia/labs/frelinger](https://www.urmc.rochester.edu/MediaLibraries/URMCMedia/labs/frelinger-lab/documents/Immunology-Lab-Manual.pdf)
10. [-lab/documents/Immunology-Lab-Manual.pdf](#)
11. https://webstor.srmist.edu.in/web_assets/downloads/2021/18BTC106J-lab-manual.pdf

SEMESTER IV
COURSE 8 IMMUNOLOGY

PRACTICAL MODEL QUESTION PAPER

Time: 2 Hrs | Max. Marks: 50

I. a) ABO and Rh blood grouping in humans (12 M)

b) Demonstration of ELISA technique (8M)

II. Answer the following experiment:

Preparation of smear for identification of lymphocytes and neutrophils (5M)

III. Identification of prepared slides with labelled diagram (3X5=15M)

A.

B.

C.

IV. Viva voce (5M)

V. Record (5M)

Total: 50 Marks

SEMESTER IV
COURSE 9 ANIMAL BIOTECHNOLOGY

SYLLABUS

UNIT-I:

Enzymes and Vectors Restriction modification systems: Types I, II and III. Mode of action, nomenclature, applications of Type II restriction enzymes in genetic engineering. DNA modifying enzymes and their applications: DNA polymerases. Terminal deoxynucleotidyl transferase, kinases and phosphatases, and DNA ligases. Cloning Vectors: Plasmid vectors: pBR and pUC series, Bacteriophage lambda and M13 based vectors, Cosmids, BACs, YACs.

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/ Preparation of models of Cloning vectors with biodegradable material.

UNIT-II:

Gene delivery: Microinjection, electroporation, biolistic method (gene gun), liposome and viral mediated delivery. PCR: Basics of PCR. DNA Sequencing: Sanger's method of DNA sequencing-traditional and automated sequencing. Hybridization techniques: Southern, Northern and Western blotting.

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/ Visit to any clinical testing laboratory for hands on experience of PCR Use.

UNIT-III:

Natural and Synthetic Cell cultures: primary culture, secondary culture, continuous cell lines. Organ culture; Cryopreservation of cultures. Hybridoma Technology: Cell fusion, Production of Monoclonal antibodies (mAb), Applications of mAb. Stem cells: Types of stem cells, applications.

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/ Visit to any clinical testing laboratory for observation of various cultures.

UNIT-IV:

Manipulation of reproduction in animals: Artificial Insemination, In vitro fertilization. Manipulation of reproduction in animals: Super ovulation, Embryo transfer, Embryo cloning. Transgenic Animals: Strategies of Gene transfer; Transgenic - sheep, - fish; applications.

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/ Visit to laboratory for observation of Artificial Insemination, In vitro fertilization/model preparation of transgenic animal.

UNIT-V:

DNA fingerprinting. Application of biotechnology in fisheries – monoculture in fishes, polyploidy in fishes. Gene therapy-application. Bio informatics- concept-definition-database types.

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/Case study.

Additional topics:

- Nature & scope of Biotechnology
- Applications of Gene delivery
- Trends in stem cell technology
- ART
- Applications of Biotechnology
- PCR applications in Animal Biotechnology
- Genetic testing

SEMESTER IV
COURSE 9 ANIMAL BIOTECHNOLOGY

BLUE PRINT

Module Name	Essay Type Questions 10M	Short Answer Questions 5M	Marks Allotted
I	1	2	20
II	1	1	15
III	2	2	30
IV	1	1	15
V	1	1	15
Total	6 (Answer 3)	7 (Answer 4)	50 Marks to be answered

SEMESTER IV
COURSE 9 ANIMAL BIOTECHNOLOGY

MODEL QUESTION PAPER

Time: 2.Hrs. | Max Marks :50

SECTION-A

I. Answer any THREE questions choosing at least one question from each section (3x10=30 Marks)

PART-I

1. Applications of Type II restriction enzymes in genetic engineering
2. What is PCR? Explain the Basics of PCR
3. What is culture? Differentiate the primary culture, secondary culture

PART-II

4. What is stem cell? Explain different Types of stem cells and their applications
5. What is the process of In vitro fertilization? Explain
6. Illustrate the DNA finger printing process

SECTION-B

II. Answer any FOUR of the following. Draw labeled diagrams wherever necessary (4x5=20Marks)

7. State the type I restriction enzymes
8. pUC vector
9. Gene gun
10. Cryopreservation of cultures
11. Stem cells
12. Transgenic-fish
13. Bioinformatics

SEMESTER IV
COURSE 9 ANIMAL BIOTECHNOLOGY

QUESTION BANK

Unit-1 Essay questions

1. Applications of Type II restriction enzymes in genetic engineering
2. Describe the DNA modifying enzymes and their applications
3. Write an essay on any two Cloning Vectors
4. Explain the difference between BACs, YAC vectors

Short Answer Questions

5. State the type I restriction enzymes
6. Polymerases
7. P UC vector
8. YACs
9. M13 based vector
10. DNA polymerase

Unit-2 Essay questions

1. Describe the deferent types of gene delivery methods
2. What is PCR? Explain the Basics of PCR
3. What is Sequencing? Explain Sanger's method of DNA sequencing
4. Illustrate the different types of Hybridization techniques

Short Answer Questions

5. Gene gun
6. Traditional method of Sequencing
7. Automative method of sequencing
8. Western Blotting method
9. Southern blotting method

Unit-3 Essay questions

1. What is culture? Differentiate the primary culture, secondary culture
2. Cryopreservation of cultures
3. Describe the Applications of mAb
4. Define MAb and explain Production of Monoclonal antibodies (MAb)
5. What is stem cell? Explain different Types of stem cells and their applications

Short Answer Questions

6. Cell culture
7. Continuous cell lines
8. Cryopreservation
9. Stem cells

Unit-4 Essay questions

1. What is the process of In vitro fertilization? Explain
2. Describe the Embryo transfer technology in Animals
3. Write an essay on Transgenic Animals

Short Answer Questions

4. Artificial Insemination

5. Superovulation
6. Gene transfer strategy
7. Transgenic-sheep
8. Transgenic-fish

Unit-5 Essay questions

1. Illustrate the DNA finger printing process
2. Explain Applications of biotechnology in fisheries
3. Write an essay on Gene therapy process and their application
4. Describe the Bio-informatics-concept-definition- data base types of Bio informatics

Short Answer Questions

5. Monoculture in fishes
6. Polyploidy in fishes
7. Gene therapy
8. Bio-informatics

REFERENCES AND PROJECTS

REFERENCES BOOKS:

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

SEMESTER IV
COURSE 9 ANIMAL BIOTECHNOLOGY

PRACTICAL SYLLABUS

1. Cloning Vectors: Plasmid vectors: p BR and p UC series, Bacteriophage lambda and M13 based vectors, Cosmides, BACs, YACs, (Charts/Images/Models).
2. DNA quantification using DPA Method.
3. Techniques: DNA Finger printing.
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. Amplifications of DNA by PCR.

Note: above practical may be demonstrated in the laboratory demonstrated by V-lab

REFERENCE WEB LINKS:

1. <https://www.vlab.co.in/broad-area-biotechnology-and-biomedical-engineeringhttps://blog.praxilabs.com/2020/06/30/dna-extraction-virtual-lab/>
2. http://mbvi-au.vlabs.ac.in/https://webstor.srmist.edu.in/web_assets/downloads/2021/18BTC203J-lab-manual.pdfhttps://webstor.srmist.edu.in/web_assets/srm_mainsite/files/files/BT%200312%20-%20ANIMAL%20CELL%20AND%20TISSUE%20CULTURE%20LABORATORY.pdf
3. <https://davjalandhar.com/dbt/biotechnology/SOP/BSc%20Biotechnology%20Semester%20V%20%26%20VI.pdf>
4. <https://davjalandhar.com/dbt/biotechnology/SOP/BSc%20Biotechnology%20Semester%20V%20%26%20VI.pdf>

SEMESTER IV
COURSE 9 ANIMAL BIOTECHNOLOGY

PRACTICAL MODEL QUESTION PAPER

1. DNA quantification using DPA Method (15 Marks)
2. Preparation of culture media (10 Marks)
3. Slides/Models/Charts Slide A, B, C (3x5=15 marks)
4. Record (05 Marks)
5. Viva Voce (05 Marks)

Total: 50 Marks

SEMESTER IV
COURSE 10 WILDLIFE AND CONSERVATION BIOLOGY

SYLLABUS

UNIT – 1

- 1.1 Wildlife wealth of India & threatened wildlife.
- 1.2 Reasons for wildlife depletion in India. Wildlife conservation approaches and limitations.
- 1.3 National Parks, Sanctuaries and Biosphere Reserves, cores and Buffers, Nodes and corridors. Community Reserve and conservation Reserves.

UNIT – 2

- 2.1 Red Data Book and Conservation status (endangered, vulnerable, rare, threatened and near threatened species)-definitions.
- 2.2 Wild life Trade & legislation- Assessment, documentation, Prevention of trade.
- 2.3 Policies and laws in Wild life management (national) and ethics.

UNIT-III

- 3.1 Biodiversity extinction and conservation approaches- Identification and prioritization of Ecologically sensitive area (ESA).
- 3.2 Regional and National approaches for biodiversity conservation.
- 3.3 Population viability analysis-conceptual foundation, uses of PVA models.

UNIT-IV

- 4.1 National and International efforts for conservation- Information on CITES, IUCN, CBD.
- 4.2 International agreements for conserving marine life. Convention on wetlands of International Importance (Ramsar convention).
- 4.3 Human impact on Terrestrial and Aquatic resources. Overview of conservation of Forest & Grassland resources.

UNIT-V

- 5.1 Human – wildlife interactions.
- 5.2 Strategies to reduce human-wildlife interactions.
- 5.3 Role of Government and NGOs in controlling human-wildlife interactions Socio-economic issues related to human-wildlife interactions.

Additional input: Human impact and the effects of poaching on the wild life of Coringa wildlife sanctuary.

SEMESTER IV
COURSE 10 WILDLIFE AND CONSERVATION BIOLOGY

BLUE PRINT

MODULE NO.	ESSAY QUESTIONS 10M	SHORT ANSWER QUESTIONS 5M	MARKS ALLOTTED
MODULE-1	2	1	25
MODULE-2	1	1	15
MODULE-3	1	2	20
MODULE-4	1	2	20
MODULE-5	1	1	15
TOTAL	6 (Answer 3)	7 (Answer 4)	50 Marks to be answered

SEMESTER IV
COURSE 10 WILDLIFE AND CONSERVATION BIOLOGY

MODEL QUESTION PAPER

Time: 2 hrs. | Max Marks: 50

SECTION - A

PART- I

Answer Any THREE of the following questions by choosing at least one question in each section
(Draw labelled diagrams wherever necessary) 3X10=30

1. Give a detailed note on the Wildlife wealth of India.
2. Describe the effectiveness of National parks in preventing species extinction by using specific global examples.
3. List out the various legislations made for prevention of wildlife trade in India.

PART – II

4. Describe the regional approaches for biodiversity conservation.
5. Human impact on terrestrial and aquatic resources. Discuss?
6. List out the various strategies that can reduce the Human – wildlife interactions.

SECTION - B

II. Answer any FOUR of the following: Draw labeled diagrams wherever necessary (4x5=20 M)

7. Threatened Species
8. Ethics
9. ESA
10. Conceptual foundation
11. CITES
12. Wetlands
13. NGOs

SEMESTER IV
COURSE 10 WILDLIFE AND CONSERVATION BIOLOGY
QUESTION BANK

UNIT: I

ESSAY QUESTIONS

1. Give a detailed note on the Wildlife wealth of India.
2. Discuss the various reasons for the depletion of wildlife in India.
3. Describe the effectiveness of National parks in preventing species extinction by using specific global examples.

SHORT ANSWER QUESTIONS:

4. Threatened Species
5. Nodes & corridors
6. Biosphere reserves

UNIT-II

Essay questions

1. Write an essay on Red data book and its Conservation status.
2. List out the various legislations made for prevention of wildlife trade in India.
3. Give a clear picture on the policies and laws of Wildlife management.

SHORT ANSWER QUESTIONS

4. Vulnerable Sps
5. Wild life trade
6. Ethics

UNIT – III

Essay questions

1. Write an essay Biodiversity extinction & Conservation approaches.
2. Describe the regional approaches for biodiversity conservation.
3. Give a detailed note on the population viability analysis and its uses.

SHORT ANSWER QUESTIONS:

4. ESA
5. PVA
6. Extinction
7. Conceptual foundation

UNIT – IV

Essay questions

1. Write an essay on the National & International efforts for conservation.
2. Give a detailed note on the international agreements for conserving marine life.
3. Human impact on terrestrial and aquatic resources. Discuss?

SHORT ANSWER QUESTIONS:

4. CITES
5. IUCN
6. Wetlands
7. Human Impact

UNIT – V

Essay questions

1. Write an essay on Human – wildlife interactions with examples.
2. List out the various strategies that can reduce the Human – wildlife interactions.
3. Give a detailed description on the Govt. role in controlling Human – wildlife interactions.

SHORT ANSWER QUESTIONS:

4. NGOs
5. Wildlife Interactions
6. Socio economic issues

REFERENCES AND PROJECTS

REFERENCES:

1. M.Kato. The Biology of Biodiversity, Springer.
2. J.C. Avise. Molecular Markers, Natural History and Evolution, Chapman & Hall, New York.
3. E.O. Wilson. Biodiversity, Academic Press, Washington.
4. G.G. Simpson. Principle of animal taxonomy, Oxford IBH Publishing Company.
5. E. Mayer. Elements of Taxonomy. E.O. Wilson. The Diversity of Life (The College Edition), W.W. Northem& Co.
6. B.K. Tikadar. Threatened Animals of India, ZSI Publication, Calcutta.

SUGGESTED ACTIVITIES:

- Visit to near by Coaringa Wild life sanctuary and report the activity with pics.
- Visit to Kambalakonda Wild life sanctuary @ Vishakhapatnam and report the activity with pics.
- Students shall (individually) visit – various types of Museums. Observe the different education models and make observations on various species present there, the procedures practiced there and submit a brief handwritten Fieldwork/Project work Report.

SEMESTER IV

COURSE 10 WILDLIFE AND CONSERVATION BIOLOGY

PRACTICAL SYLLABUS

1. Using photographs / paintings / coloured drawings identify and study ecological role of characteristic animal species (major representative species only) of various Biomes.
2. Identify marine and fresh water planktons (preserved water samples may be used).
3. Study of animal architecture (photographs / diagram / abandoned specimen); Hive of honey bee, nest of wasp, nest of potter wasp, Mount of termite, Nests of Weaver Bird and tailor bird.
4. Using photographs / paintings / coloured drawings identify and study distribution and ecological role of common bivalves and gastropods that occur along a sea-shore.
5. Compare and interpret given sonograms of bird calls (any two e.g. Courtship calls, Alarm calls).
6. On a phytogeographic map of India locate & demarcate major sanctuaries / national parks.

WEB RESOURCES FOR LAB:

- [https://www.naturepl.com/pictures/pdfs/NPL_Architecture.pdf](https://www.naturepl.com/pictures/pdfs/NPL_Architecture.pdf)
- <https://youtu.be/31PWjb7Do1s>

SEMESTER IV
COURSE 10 WILDLIFE AND CONSERVATION BIOLOGY

PRACTICAL MODEL QUESTION PAPER

MAX MARKS-50

Part A

1. Identify the given photographs / paintings / coloured drawings (3X4= 12 Marks)

- a.
- b.
- c.

2. Identify the given marine and fresh water planktons (2X2= 8 Marks)

Part B

3. Study of animal architecture (photographs / diagram / abandoned specimen.) (10 Marks)

4. Locate & demarcate the Coringa wildlife sanctuary on a phytogeographic map of India (5 Marks)

Part C — Field visit report (5 Marks)

Part D — Viva Voce (5 Marks)

Part E — Record and Observation Book (5 Marks)

TOTAL: 50 MARKS

SEMESTER V
COURSE 12 POULTRY MANAGEMENT – I

W.E.F. AY 2023-24 OLD SYLLABUS

SYLLABUS

Unit 1 Indian poultry Industry

Importance of poultry farming and poultry development in India. Present status and future prospectus of poultry Industry. Classification of poultry based on genetics Utility.

Unit -2 Scientific Poultry Keeping

Modern breeds of Chicken. Present day egg production lines- meat production lines. Mini breeds-dwarfism in mini-Leghorns.

Unit-3 Diversified Poultry

Ducks and Geese-classification- rearing system-classification-advantages. Guinea fowls - guinea fowl farming in India-Production-varieties. Emu-rearing- Economical aspects-commercial products.

Unit-4 Desi Chickens:

Indigenous breeds and economical aspects of desi chicken. Indigenous breeds-Aseel-Chittagong-Kadaknath-Bursa. Improved varieties in India – Giriraja-Vanaraja-Girirani-Kalinga brown, Gramapriya,Swarnandhra.

Unit -5 Breeds from Central Avian Research Institute – Izatnagar

CARI Nirbheek - CARI- Shyama-HITCARI (Naked Neck Cross). CARI- Priya Layer, CARI- Sonali Layer. CARIBRO-VISHAL, CARI-RAINBRO, Nandanam chicken-I, Nandanam Chicken-II, Nandanm-Quail.

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above.

SEMESTER V
COURSE 12 POULTRY MANAGEMENT – I
W.E.F. AY 2023-24 OLD SYLLABUS

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MODULE NO.	ESSAY QUESTIONS 10M	SHORT ANSWER QUESTIONS 5M	MARKS ALLOTED
MODULE-1	1	1	15
MODULE-2	1	2	20
MODULE-3	1	2	20
MODULE-4	2	1	25
MODULE-5	1	1	15
TOTAL	6 (Answer 3)	7 (Answer 4)	50 Marks to be answered

SEMESTER V
COURSE 12 POULTRY MANAGEMENT – I

W.E.F. AY 2023-24 OLD SYLLABUS

MODEL QUESTION PAPER

Time: 2 hrs. | Max Marks: 50

SECTION - A

Answer Any THREE of the following questions by choosing at least one question in each Part
(Draw labelled diagrams wherever necessary) (3X10=30M)

PART- I

1. Discuss the present and future prospectus of poultry industry in India.
2. Describe the various types of mini breeds and add a note on dwarfism in leghorns.
3. Write an essay on Emu-farming its economic aspects and the various commercial products of it.

PART- II

4. Give a detailed note on the indigenous breeds and the economic aspects of desi chicken.
5. Improved varieties in India – Explain. Add a note on any three varieties.
6. Discuss the functions and activities of CARI in brief.

SECTION B

Answer any FOUR of the following: Draw labeled diagrams wherever necessary (4x5=20 M)

7. Write a short note on poultry development in India.
8. Modern chick breeds.
9. Egg production in AP.
10. Write a short note on Duck rearing system.
11. Guinea fowl.
12. Kadaknath.
13. HITCARI.

SEMESTER V
COURSE 12 POULTRY MANAGEMENT – I

W.E.F. AY 2023-24 OLD SYLLABUS

QUESTION BANK

UNIT: I

ESSAY QUESTIONS

1. Discuss the development of poultry farming in India.
2. Explain the importance of poultry and its farming.
3. Give a detailed note on the present status and future prospectus of poultry industry.
4. Classify the poultry breeds basing on their genetic utility.

SHORT ANSWER QUESTIONS:

5. Poultry farming.
6. Future prospects of poultry.
7. Genetic utility.

UNIT-II

Essay questions

1. Write an essay on modern chick breeds.
2. Discuss the present-day egg production lines in AP.
3. Describe the various mini breeds and add a note on dwarfism in Leghorns.

SHORT ANSWER QUESTIONS

4. Rhode Island Reds
5. Cornish
6. Leghorn
7. Meat production
8. Dwarfism

UNIT – III

Essay questions

1. Classify the various types of rearing systems and their advantages.
2. Write an essay on the various breeds of Ducks.
3. Describe the farming of Guinea fowl in India and its varieties.
4. Write an essay on emu farming and its economic importance.
5. Give a detailed note on the commercial products of Emu.

SHORT ANSWER QUESTIONS:

6. Embden Gees.
7. Malard Duck.
8. Pearl grey Guinea fowl.
9. Gunia foul farming?
10. Emu economic importance.
11. Emu Oil.

UNIT – IV

Essay questions

1. Write an essay on the indigenous chick breeds and their economics aspects.
2. Describe the importance of Bursa.
3. list out the various improved indigenous varieties and add a note on Giriraja.
4. List out the various types of desi chicken and their economic importance.

SHORT ANSWER QUESTIONS:

5. Kadaknath.
6. Aseel.
7. Economic aspects of Indigenous breeds.
8. Vanaraja.
9. Girirani.
10. Kalinga brown.
11. Swarnandra.

UNIT – V

Essay questions

1. Define CARI and list out the various types of research activities carried out by CARI.
2. Differentiate Priya layer and Sonali layer.
3. Write a detailed note on RAINBRO and its importance.
4. Discuss the farming & economic importance of Nandanam Quail.

SHORT ANSWER QUESTIONS:

5. CARI Shyam.
6. Naked Neck Cross.
7. Sonali Layer.
8. CARIBRO VISHAL.
9. Nandanam Chicken.

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above

REFERENCES AND PROJECTS

REFERENCES:

1. Text Book of Poultry Science, P V Sreenivasaiah, Write and Print Publications, ISBN No. 9788192970592.
2. Poultry Science Practices, Nilothpal Ghosh, CBS Publication & Distributions, 2015.
3. Principles of Poultry Science, 1996, CAB Publishers, ISBN 9780851991221.
4. A Text Book of Animal Husbandry, C. C. Banerjee, Oxford and IBH, Publish Co, ISBN: 9788120412606.

Web sources:

1. Text Book of Poultry Science, P V Sreenivasaiah, Write and Print Publications, ISBN No. 9788192970592, 8192970590
2. <https://www.drvt.in/p/e-books.html>
3. <https://byjus.com/biology/animal-husbandry-poultry-farming/>
4. https://www.helpforag.app/2018/02/livestock-production-and-management- lpm_14.html?m=1

Co-Curricular Activities: Students shall (individually) visit – various types of poultry systems. Observe the different types of indigenous breeds being farmed and make observations on procedures practiced there and submit a brief handwritten Fieldwork/Project work Report.

SEMESTER V
COURSE 12 POULTRY MANAGEMENT – I

W.E.F. AY 2023-24 OLD SYLLABUS

PRACTICAL SYLLABUS

1. Different types of Poultry rearing (Students has to observe and draw the different types of poultry rearing systems).
 2. Different types of poultry Housing - Models / Images/charts.
 3. Different layer breeds images/charts/ Models (Observation of characters).
 4. Types of broilers images/charts/ Models (Identification of important Characters).
 5. CARI breeds characters –images/charts.
 6. Nandanam breeds- images/charts (Identification of characters).
- (This practical is 70% Web based/virtual, 30% physical).*

REFERENCE WEB LINKS:

1. A Text Book of Animal Husbandry, C. C. Banerjee, Oxford and IBH, Publish Co, ISBN: 9788120412606
2. http://www.agritech.tnau.ac.in/expert_system/poultry/Poultry%20House%20Construction.html
3. <https://petkeen.com/best-chicken-breeds-for-eggs/>
4. <https://garden.decorexpro.com/en/hozyajstvo/ptitsevodstvo/porody-brojlernyh-kur-s-foto-iopisaniem.html>
5. **Co-Curricular Activities:** a) Mandatory:
 - a. For Teacher: Training of students by the teacher in laboratory and field on the techniques of identification of layers, broilers and management practices in poultry.
 - b. For Student: Students shall Individually visit a Poultry farm, make observations and report on the Rearing, Housing, Brooding, Feeding and water management activities. The student shall submit a handwritten Fieldwork/Project work Report on the observations along with pictures in the given format not exceeding 10 pages to teacher.
 - c. Max marks for Fieldwork/Project work Report: 05.
 - d. Suggested Format for Fieldwork/Project work: Title page, student details, index page, detailsof place visited, observations made, findings and acknowledgements.
 - e. Unit tests. (IE)
6. Suggested Co-Curricular Activities
 - a. Web resources – visiting the web sites of CARI-IZATNAGA <https://cari.icar.gov.in> procuring additional information on the poultry breeds
 - b. Web resources- visiting the web site of NANADANAM http://www.tanuv.ac.in/ipmmadhavaram_tech.html
 - c. Collection of additional data on different types of Poultry breeds
 - d. Seminar, Assignment, Group discussion. Quiz, Collection of Material

SEMESTER V
COURSE 12 POULTRY MANAGEMENT – I
W.E.F. AY 2023-24 OLD SYLLABUS

PRACTICAL MODEL QUESTION PAPER

MAX MARKS-50

Part A — Major Experiment (20 Marks)

1. Different types of poultry housing systems.

Part B — Identification (4X4= 16 Marks)

2. Identify the given chart/model/specimen. Draw a neat labelled diagram

- White leghorn
- Emu
- Chittagong
- Nandanam Quail

Part C — Field visit report (4 Marks)

Part D — Viva Voce (5 Marks)

Part E — Record and Observation Book (5 Marks)

TOTAL: 50 MARKS

SEMESTER V
COURSE 13 POULTRY MANAGEMENT – II (POULTRY PRODUCTION AND MANAGEMENT)

W.E.F. AY 2023-24 OLD SYLLABUS

SYLLABUS

Unit-1 HEALTH CARE

Common poultry diseases: bacterial, viral, fungal, parasitic and nutritional deficiencies. Vaccination schedule for commercial layers and broilers: factors that govern vaccination schedule; vaccination principles type, methods, pre and post vaccination care. Disinfection: Types of disinfectants; mode of action; recommended procedure; precaution and handling.

Unit-2 ECONOMICS

Economics of layer and broiler production. Projects reports in different systems of rearing for layer & broilers. Feasibility studies on poultry rearing- in context of small units and their profitability. Export/import of poultry and poultry products.

Unit-3 BREEDER FLOCK MANAGEMENT

Layer and broiler breeder flock management housing & space requirements. Different stage of management during life cycle; Light management during growing and laying period, Artificial insemination. Feeding: Feed restriction, separate male feeding. Nutrient requirement of layer and broiler breeders of different age groups.

Unit-4 BREEDER HEALTHCARE

Vaccination of breeder flock; difference between vaccination schedule of broilers and commercial birds. Common diseases of breeders (Infectious and metabolic disorders)-prevention. Fertility disorder- etiology, diagnosis and corrective measures. Selection and culling of breeder flocks.

Unit-5 HATCHERY PRACTICES

Management principles of incubation. Factors affecting fertility and hatchability. Selection, care and incubation of hatching eggs. Fumigation; sanitation and hatchery hygiene. Importance of hatchery records, break even analysis of unhatched eggs.

SEMESTER V
COURSE 13 POULTRY MANAGEMENT – II (POULTRY PRODUCTION AND MANAGEMENT)

W.E.F. AY 2023-24 OLD SYLLABUS

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Unit	Essay	Short
I	1	1
II	1	1
III	1	2
IV	1	2
V	2	1

- Out of 6, 3 questions should be answered (3X10=30M)
- Out of 7, 4 questions should be answered (4X5=20M)

SEMESTER V
COURSE 13 POULTRY MANAGEMENT – II (POULTRY PRODUCTION AND MANAGEMENT)

W.E.F. AY 2023-24 OLD SYLLABUS

MODEL QUESTION PAPER

Time: 2 hrs | Max. Marks :50

SECTION- A

Note: Answer any THREE questions choosing at least one question from each section. Draw the diagrams wherever necessary (3 X10 = 30)

PART – I

1. Write an essay on the common diseases affecting poultry birds.
2. Explain the economics of layer and broiler production.
3. Write an essay on the housing and space requirements for the layer breeder flock management.

Part – II

4. Write an essay on vaccination in breeder flock.
5. Explain the factors affecting fertility and hatchability in poultry birds.
6. What are the various hatchery records to be maintained in a poultry farm. Explain their importance.

SECTION-B

Answer any Four of the following. (4x5=20)

7. Types of disinfectants in poultry
8. Feasibility studies in poultry rearing
9. Artificial insemination in poultry
10. Nutrient requirement in layer birds
11. Fertility disorder in poultry
12. Any two infectious diseases in breeders
13. Management principles of incubation

SEMESTER V
COURSE 13 POULTRY MANAGEMENT – II (POULTRY PRODUCTION AND MANAGEMENT)

W.E.F. AY 2023-24 OLD SYLLABUS

QUESTION BANK

ESSAY TYPE QUESTIONS

1. Write an essay on the common diseases affecting poultry birds
2. Write about the vaccination schedule for commercial layers. Add a note on the factors which govern vaccination schedule in poultry
3. Explain the economics of layer and broiler production
4. Explain the preparation of project report in different systems of rearing of layer birds
5. Write an essay on the export and import of poultry and poultry products
6. What is a feasibility study? Explain feasibility studies on poultry rearing in the context of small units
7. Write an essay on the housing and space requirements for the layer breeder flock management.
8. Write an essay on the housing and space requirements for the broiler breeder flock management.
9. Explain different stages of management during life cycle in poultry
10. Write an essay on vaccination in breeder flock
11. Explain the common diseases affecting breeder birds
12. Explain the etiology, diagnosis and corrective measures for fertility disorder in poultry birds
13. Explain the factors affecting fertility and hatchability in poultry birds
14. What are the various hatchery records to be maintained in a poultry farm. Explain their importance.
15. Write an essay on selection, care and incubation of hatching eggs

SHORT ANSWER TYPE QUESTIONS

1. Types of disinfectants in poultry
2. Pre and post vaccination care
3. Coccidiosis
4. Avian influenza
5. Fowl pox
6. Mareks disease
7. New castle disease
8. Aspergillosis
9. Colibacillosis
10. Fowl Typhoid
11. Pullorum disease
12. Feasibility studies in poultry rearing
13. Light management during growing and laying
14. Artificial insemination in poultry
15. Nutrient requirement in layer birds
16. Fertility disorder in poultry
17. Culling of breeder flocks
18. Any two infectious diseases in breeders
19. Management principles of incubation
20. Hatchery records

21. Break even analysis of unhatched eggs
22. Fumigation
23. Sanitation and hatchery hygiene
24. Computer applications for hatchery management

REFERENCES AND PROJECTS

REFERENCES:

1. HVS Chauhan, S. Roy, Poultry Diseases, Diagnosis and Treatment, New Age International Publishers-2018

Web resources:

- <https://www.drvet.in/p/e-books.html>
- <https://byjus.com/biology/animal-husbandry-poultry-farming/>
- [https://www.helpforag.app/2018/02/livestock-production-and-management-lpm_14.html?m=1](https://www.helpforag.app/2018/02/livestock-production-and-management-lpm_14.html?m=1)

SEMESTER V
COURSE 13 POULTRY MANAGEMENT – II (POULTRY PRODUCTION AND MANAGEMENT)

W.E.F. AY 2023-24 OLD SYLLABUS

PRACTICAL SYLLABUS

1. Poultry Viral diseases – Observation of histopathological slides
2. Poultry Fungal Diseases- Observation of histopathological slides
3. Poultry Bacterial Diseases-Observation of histopathological slides
4. Feasibility study of Poultry establishment: (Preparation of feasibility study report with given parameters)
5. Rearing of Layers – (Preparation of Flow chart)
6. Rearing of broiler- Flow chart
7. Hatchery records- Model study/analysis- Report with modified data

REFERENCE WEB LINKS:

- Flow chart hatchery:
<http://lms.tanuvas.ac.in/mod/resource/view.php?id=45106>
- Feasibility report:
[<https://www.manage.gov.in/stry&fcac/content/19.%20Project%20Report%20on%20Layer%20Poultry.pdf>]
- (<https://www.manage.gov.in/stry&fcac/content/19.%20Project%20Report%20on%20Layer%20Poultry.pdf>)

SEMESTER V
COURSE 13 POULTRY MANAGEMENT – II (POULTRY PRODUCTION AND MANAGEMENT)

W.E.F. AY 2023-24 OLD SYLLABUS

PRACTICAL MODEL QUESTION PAPER

Time: 2hrs | Max Marks: 50

1. Identification and write notes on the following (3X5=15M)
 - a) Viral disease-histopathological slide
 - b) Bacterial histopathological slide
 - c) Fungal histopathological slide
2. Preparation of feasibility study report for poultry establishment (10M)
3. Rearing of layers/broilers-flow chart (5M)
4. Hatchery records (5M)
5. Field work/Project work (5M)
6. Record (05M)
7. Viva (05M)

Total: 50M

SEMESTER V
COURSE 14 A SUSTAINABLE AQUACULTURE MANAGEMENT

W.E.F. AY 2023-24 OLD SYLLABUS

SYLLABUS

UNIT I:

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

UNIT II:

Functional classification of ponds – head pond, hatchery, nursery ponds. Functional classification of ponds -rearing, production, stocking and quarantine ponds. Need of fertilizer and manure application in culture ponds. Physico-chemical conditions of soil and water optimum for culture (Temperature, depth, turbidity, light, water, PH, BOD, CO₂ and nutrients).

UNIT III:

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

UNIT IV:

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

UNIT V:

Viral diseases of Fin Fish & shell fish. Fungal diseases of Fin & Shell fish. Bacterial diseases of Finfish & Shell fish. Prophylaxis in aquaculture.

Additional Inputs: Future scenario of aquaculture. Need of liming of pond. Sources of seed for aquaculture practices.

SEMESTER V
COURSE 14 A SUSTAINABLE AQUACULTURE MANAGEMENT

W.E.F. AY 2023-24 OLD SYLLABUS

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Module No	Essay Type Questions 10M	Short Answer Questions 5M	Marks Allotted
UNIT I	1	1	15
UNIT II	1	2	20
UNIT III	2	1	25
UNIT IV	1	2	20
UNIT V	1	1	15
Total	6 (Answer 3)	7 (Answer 4)	50 Marks to be answered

SEMESTER V
COURSE 14 A SUSTAINABLE AQUACULTURE MANAGEMENT

W.E.F. AY 2023-24 OLD SYLLABUS

MODEL QUESTION PAPER

SECTION-A

Answer any THREE questions choosing at least one question from each section. Draw the diagrams wherever necessary (3X10 =30)

PART -I

1. Describe the present status of Aquaculture in Global and National Scenario
2. Write an essay on Design and construction of a fish farm
3. What are the Physico -chemical conditions of water required for aquaculture

PART - II

4. Write an essay on Induced breeding
5. Explain the mixed culture of Fish and Prawn
6. Explain viral diseases in Fin Fish

SECTION- B

Answer any Four questions (4x5=20)

7. Nursery pond
8. Turbidity
9. Fertilizer in culture pond
10. Algal bloom
11. Quarantine pond
12. Macrobrachium
13. White Spot Disease

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COURSE 14 A SUSTAINABLE AQUACULTURE MANAGEMENT

W.E.F. AY 2023-24 OLD SYLLABUS

QUESTION BANK

Module- I

Essay Questions

1. What is the current status of aquaculture at global and national level?
2. Describe Major Cultivable Freshwater fishes
3. Write an essay on Major cultivable species for brackish water
4. Write an essay on Design and Construction of Fish farm
5. Explain the Traditional, extensive, modified extensive, semi-intensive and intensive cultures of fish.
6. Explain the Traditional, extensive, modified extensive, semi-intensive and intensive cultures of shrimp.

Short Answer Questions

7. Any 2 Brackish water food fishes
8. Any 2 Marine food fishes
9. Criteria for selection of Fishes for cultivation
10. Extensive fish culture
11. Traditional fish culture

Module II

Essay Questions

1. What are the Physico-chemical conditions of soil and water required for aqua culture
2. What is the Functional Classification of Ponds in a fish farm
3. Need of fertilizer and manure application in culture ponds

Short Answer Questions

4. Nursery Pond
5. Turbidity
6. Fertilizer in Culture Pond
7. Quarantine Pond
8. Stocking pond
9. BOD
10. Nutrients

Module III

Essay Questions

1. Write an essay on Induced Breeding
2. Culture of Indian Major carps- Pre- stocking
3. Culture of Indian major carps - Stocking management
4. Culture of Indian major carps - post-stocking management

Short Answer Questions

5. Algal Bloom
6. Liming

7. Stocking density
8. Predators
9. Ova prim

Module IV

Essay Questions

1. Explain the mixed culture of Fish and Prawn
2. Commercial Importance of shrimp & prawn
3. Macrobrachium rosenbergii- biology, seed production.
4. Culture of L. vannamei – hatchery technology and culture practices

Short Answer Questions

5. Vannamei
6. Macrobrachium
7. Larval Stages of Prawn
8. Types of Hatcheries
9. Eye stalk ablation

Module V

Essay Questions

1. Explain the viral diseases in Fin Fish & shell fish
2. Explain the Bacterial Diseases in Prawns
3. Describe the Bacterial diseases of Fin fish
4. Explain the Fungal Diseases of Fish
5. Fungal diseases of Fin & Shell fish
6. Prophylaxis in aquaculture

Short answers

7. Any two viral diseases in Prawns
8. Any two bacterial diseases in fish
9. White spot disease
10. Dropsy
11. Prophylaxis

REFERENCES AND PROJECTS

REFERENCES:

1. Pillay TVR & M.A. Dill, 1979. Advances in Aquaculture. Fishing News Books Ltd., London.
2. Stickney RR 1979. Principles of Warm Water Aquaculture. John Wiley & Sons Inc.
4. Bose AN et.al. 1991. Costal Aquaculture Engineering. Oxford & IBH Publishing Company Pvt. Ltd.

Web Links:

1. http://www.fao.org/fishery/docs/CDrom/FAO_Training/FAO_Training/General/x6708e/x6708e06.htmhttp://aquaticcommons.org/1666/1/Better-Practice3_opt.pdf
<https://www.notesonzooology.com/india/fishery/fish-diseases-symptoms-and-control-fishery/871>

SEMESTER V
COURSE 14 A SUSTAINABLE AQUACULTURE MANAGEMENT

W.E.F. AY 2023-24 OLD SYLLABUS

PRACTICAL SYLLABUS

1. Fresh water Cultivable species (Fin& Shell Fish Specimens – Observation of morphological characters by observation and drawings)- Any three.
2. Brackish water cultivable species (Fin &Shellfish-Specimens-Observation of Morphological Character by observing drawing) Any three.
3. Hands on training on the use of kits for determination of water quality in aquaculture (DO, Salinity, pH, Turbidity).
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 pathological slides/Charts/ Models of viral pathogens in fin/ shell fish) ANY THREE.
6. Bacterial diseases of Fin &Shell Fish (Observation of histopathological slides/ Charts/Models - ANY THREE.
7. Fungal diseases of Fin & Shell Fish (Observation of histo pathological slides/Charts/ Models of Bacterial pathogens in fin/ shell fish) Any three.

REFERENCE WEB LINKS:

- Lab References: Boyd CE1982. Water Quality Management for Pond Fish Culture. Elsevier Scientific Publishing Company.

SEMESTER V
COURSE 14 A SUSTAINABLE AQUACULTURE MANAGEMENT

W.E.F. AY 2023-24 OLD SYLLABUS

PRACTICAL MODEL QUESTION PAPER

Time: 2Hours | Max.Marks: 50

I. Identify the following spotters/Charts/Photographs (6x5=30M)

- A. Fresh water fishes
- B. Brackish water fish
- C. Viral disease fish/prawn
- D. Bacterial Disease fish/prawn
- E. Marine Fish
- F. Fungal Disease fish/prawn

II. Record (05M)

III. Field note book/project work report (10M)

IV. Viva voce (05M)

Total: 50M

SEMESTER V

COURSE 15 POSTHARVEST TECHNOLOGY OF FISH AND FISHERIES

W.E.F. AY 2023-24 OLD SYLLABUS

SYLLABUS:

Unit – I

Handling and Principles of fish Preservation

1.1 Handling of fresh fish, storage and transport of fresh fish, post mortem changes (rigor mortis and

spoilage), spoilage in marine fish and freshwater fish.

1.2 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

2.1 Traditional methods - sun drying, salt curing, 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

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

3.2 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 National and International standards – ISO 9000: 2000 Series of Quality Assurance System, *Codex Alimentarius*.

REFERENCES:

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

2. Lakshmi Prasad's, Fish Processing Technology 2012, Arjun Publishing House

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

4. Safety and Quality Issues in Fish Processing (Woodhead Publishing Series in Food Science, Technology and Nutrition) by H A Bremner K.A Mahanthy, Innovations in Fishing and Fish Processing Technologies, January 2021

Web resources:

5. <http://ecoursesonline.iasri.res.in/mod/page/view.php?id=145743>

6. https://ecourses.icar.gov.in/e-Learningdownload3_new.aspx?Degree_Id=03

SEMESTER V

COURSE 15 POSTHARVEST TECHNOLOGY OF FISH AND FISHERIES

W.E.F. AY 2023-24 OLD SYLLABUS

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MODULE NO.	ESSAY QUESTIONS 10M	SHORT ANSWER QUESTIONS 5M	MARKS ALLOTED
MODULE-1	1	2	20
MODULE-2	1	1	15
MODULE-3	2	2	30
MODULE-4	1	1	15
MODULE-5	1	1	15
TOTAL	6 (Answer 3)	7 (Answer 5)	50 Marks to be answered

SEMESTER V
COURSE 15 POSTHARVEST TECHNOLOGY OF FISH AND FISHERIES
W.E.F. AY 2023-24 OLD SYLLABUS

MODEL QUESTION PAPER

Time: 3 hrs. | Max Marks: 50

SECTION –A

Answer Any THREE of the following by choosing at least one question in each section (Draw labelled diagrams wherever necessary) (3X10=30)

PART- I

1. Describe storage and transport of fresh fish.
2. Discuss any four advanced methods of fish preservation.
3. Explain various Fish Products and their applications.
4. Write the Industrial Importance of Fish By-Products.
5. Discuss on Environmental and personal hygiene in fish processing plants.
6. Write about Seafood Quality Assurance System Ensuring Safety Standards.

SECTION - B

Answer any FOUR of the following: Draw labeled diagrams wherever necessary (4x5=20 M)

7. Comment on rigor mortis
8. Explain Advanced freeze drying
9. Role of Gamma rays
10. Fish oils
11. HACCP
12. GMP
13. ISO certification

SEMESTER V

COURSE 15 POSTHARVEST TECHNOLOGY OF FISH AND FISHERIES

W.E.F. AY 2023-24 OLD SYLLABUS

QUESTION BANK

ESSAY QUESTIONS

1. Describe storage and transport of fresh fish.
2. Write an essay on traditional methods of fish preservation.
3. Discuss on spoilage in marine and freshwater fish.
4. Describe the principles of fish preservation.
5. Write About Traditional Methods of Fish Preservation.
6. Discuss the role of modern methods fish preservation.
7. Discuss the various types of fish products derived from fish and their importance in the food industry.
8. Explain any our fish by-products and their significance industry.
9. Describe the nutritional and economic value of fish protein concentrate, fish meal, and fish oil.
10. Discuss the importance of environmental hygiene in fish processing plants.
11. Explain the role of personal hygiene in ensuring the safety and quality of fish and fishery products. Include examples of personal hygiene practices.
12. Explain the importance of Good Manufacturing Practices (GMPs), Good Laboratory Practices (GLPs).
13. Discuss the concept of Hazard Analysis and Critical Control Points (HACCP) in the seafood industry.
14. Evaluate the challenges and advantages in adopting international standards such as ISO 9000 and Codex Alimentarius in sea food industry.

SHORT ANSWER QUESTIONS:

1. Salting
2. Drying
3. Chilling
4. Rigor Mortis
5. Smoking
6. Canning
7. AFD
8. RSW
9. Fish minced meat
10. Chitosan
11. Fish meal
12. Isin glass
13. Fish leather
14. Fish manure
15. Fish ensilage
16. Environmental Hygiene
17. Personal Hygiene
18. GMP
19. GLP
20. Codex Alimentarius

21. Iso certification

REFERENCES AND PROJECTS

REFERENCES:

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

Web Links:

- [https://ecourses.icar.gov.in/e-Leaarningdownload3_new.aspx?Degree_Id=03](https://ecourses.icar.gov.in/e-Leaarningdownload3_new.aspx?Degree_Id=03)
- [https://krishi.icar.gov.in/jspui/bitstream/123456789/20770/1/Training%20Manual_Hygienic%20drying%20and%20packing%20of%20fish.pdf](https://www.google.com/search?q=https://krishi.icar.gov.in/jspui/bitstream/123456789/20770/1/Training%2520Manual_Hygienic%2520drying%2520and%2520packing%2520of%2520fish.pdf)

SEMESTER V

COURSE 15 POSTHARVEST TECHNOLOGY OF FISH AND FISHERIES

W.E.F. AY 2023-24 OLD SYLLABUS

PRACTICAL SYLLABUS

1. Evaluation of fish/ fishery products for organoleptic, chemical and microbial quality.
2. Preparation of dried, cured and fermented fish products.
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 worksheet.
7. Corrective action procedures in processing of fish- flow chart- work sheet preparation.

SEMESTER V
COURSE 15 POSTHARVEST TECHNOLOGY OF FISH AND FISHERIES
W.E.F. AY 2023-24 OLD SYLLABUS

PRACTICAL MODEL QUESTION PAPER

MAX MARKS-50

Part A — Major Experiments (30 Marks)

Answer the following:

1. Evaluate the given fish/fishery product for (15 marks):
 - a) Organoleptic quality of Fish (OR)
 - b) Chemical Evaluation for Freshness of fish
2. Prepare a dried, cured, or fermented fish product and (15 marks):
 - a) Record the process in a flow chart (OR)
 - b) Examine salt, protein, and moisture content in the final product

Part B

II. Answer the following: ($2 \times 5 = 10$ marks)

3. Examine the spoilage in a given dried/cured fish product, marinade, or fish pickle. Record signs of spoilage and probable causes.
4. Prepare a hazard analysis worksheet for a fish processing operation (drying, curing, or fermentation).

Part C

5. Viva Voce (5 Marks)
6. Record (5 Marks)

TOTAL: 50 MARKS

COMMON VALUE-ADDED COURSE ENVIRONMENTAL EDUCATION

SYLLABUS

Unit 1: Environment and Natural Resources

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

Unit-2: Environmental degradation and impacts

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

Unit 3: Conservation of Environment

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

Suggested activities to learner:

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

Suggested text book :

- 1 ErachBarucha (2004) Text book of Environmental Studies for Undergraduate courses
- 2 (Prepared for University Grants Commmission) Universities Press.
- 3 PurnimaSmarath (2018) Environmental studies Kalyani Publishers, Ludhiana

Reference books :

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

V SEMESTER

COMMON VALUE-ADDED COURSE ENVIRONMENTAL EDUCATION

Model Paper

Time :2 hrs | Max Marks: 50

SECTION - A

Answer any four question. Each question carries 5 marks

(4x5=20 marks)

1. Explain about the land resources and their use in daily life.
2. Describe about Greenhouse effect.
3. Write briefly about the water pollution.
4. Chipko Movement and Silent valley movements.
5. Natural calamities or disasters
6. Describe Wild life protection Act.
7. What is Ex-situ conservation of biodiversity?
8. Write a short note on Bishnoi's of Rajasthan

SECTION B

Answer any three questions. Each question carries 10 marks
marks)

(3x10=30

9. Define Biodiversity and explain value of biodiversity.

(or)

Explain the water resources in India and their importance

- 10.: Explain the Causes and effects of Deforestation

(or)

What is pollution? Give a brief account on soil pollutions

11. Explain the environmental protection act 1986.

(or)

Write an essay on Solid waste management

V SEMESTER

COMMON VALUE-ADDED COURSE ENVIRONMENTAL EDUCATION

QUESTION BANK

UNIT-1

ESSAY QUESTIONS

1. Explain the Multidisciplinary nature of environmental education
2. Define environmental education. Write the scope and importance of the environmental education.
3. Explain the water resources in India and their importance
4. Define the biodiversity. Explain the value of biodiversity.

SHORT ANSWER QUESTIONS

1. Soil erosion and causes for soil erosion.
2. Write a short note on Water cycle.
3. Write short note on Chipko movement.
4. Jhum or Podu cultivation.
5. Forest mining.

UNIT-2

ESSAY QUESTION

1. Discuss about human population growth and its impacts on environment.
2. Write about renewable and non-renewable energy resources, their utilization
3. What is pollution? Give a brief account on soil pollutions.
4. Explain the Causes and effects of Deforestation

SHORT ANSWER QUESTIONS

1. Conflicts over water.
2. Depletion of ozone layer.
3. Water pollution.
4. Air pollution.
5. Natural calamities or disasters.

UNIT-3

ESSAY QUESTIONS

1. Write about the Montreal and Kyoto protocols on environment
2. Write an essay on Solid waste management
3. Explain the environmental protection act 1986.
4. What are the salient features of forest conservation 1980.

SHORT ANSWER QUESTIONS

1. Ex-situ conservation of biodiversity
2. Wild life protection act. 1972.
3. Write a short note on Bishnoi's of Rajasthan.
4. Write a short note on Silent valley movement.

DEPARTMENT OF ZOOLOGY & AQUACULTURE
LIST OF EXAMINERS

S. No	Name of the Examiners	Subject	Name of the College
1.	Dr.N. Sreenivas	Zoology	GDCRamachandrapuram
2.	B. AhmadAliBaba	Zoology	GDC Pithapuram
3.	Dr. PJohnKiran	Zoology	GDC, Nakkapalli
4.	Dr.M. Vijaya Kumar	Zoology	SRRGDCVijayawada
5.	Dr.P. JayaBharathi	Zoology	VSK College, Vizag
6.	N. Suneetha	Zoology	SRR GDC, Vijayawada
7.	V.Sandhya	Zoology	GDC, Kaikaluru
8.	Dr. R. P Dattu	Zoology	GDC, Tiruvuru.
9.	Dr. K. RamaRao	Zoology	VSK College, Vizag
10.	Dr.T. Samuel DavidRaj	Zoology	GDC, Porumamilla
11.	Dr. P.R Vani	Zoology	VSK College, Vizag
12.	DrY.PoliNaidu	Zoology	GDC, Srikakulam
13.	A. Arjuna Apparao	Zoology	GDC, Yellamanchili
14.	Dr. D. Sailaja	Zoology	GDC, rajamahendravaram
15.	P.S.C.H.P Deepika Rani	Zoology	SKR College(W), Rajahmundry
16.	DrG.VijayPrathap	Zoology	VSK College, Vizag
17.	Dr.Y. Shantiprabha	Zoology	VSK College, Vizag
18.	M. Vasantha Lakshmi	Zoology	ASD GDC (W), A, Kakinada

DEPARTMENT OF ZOOLOGY
LIST OF QUESTION PAPER SETTERS

S. No	Name of the Examiners	Subject	Name of the College
1.	Dr. N. Sreenivas	Zoology	GDC Ramachandrapuram 9912760880 zoonsreenivas4@gmail.com
2.	B. Ahmad Ali Baba	Zoology	9849320443 bollojubaba@gmail.com
3.	Dr. P John Kiran	Zoology	7799161783 Johnzool75@gmail.com
4.	Dr.M. Vijaya Kumar	Zoology	9490086886 mekalavkumar@gmail.com
5.	Dr.P. Jaya Bharathi	Zoology	8978494740
6.	N. Suneetha	Zoology	9703332851
7.	V. Sandhya	Zoology	9666033718 Sandijosh777@gmail.com
8.	Dr. R P Dattu	Zoology	9441348194 praveendathurajula@gmail.com
9.	Dr. K Rama Rao	Zoology	9010705687 drkarriramarao@gmail.com
10.	Dr. T Samuel David Raj	Zoology	88979924001 hisanthi@gmail.com
11.	Dr. P R Vani	Zoology	9866886992 vaniprupa@yahoo.co.in
12.	Dr Y. Poli Naidu	Zoology	9492542342 Naiduzoology@gmail.com
13.	A. Arjuna Apparao	Zoology	9949449941 Arjunaadari@gmail.com
14.	Dr G. Mani	Zoology	9247872648 drgmani@gamil.com
15.	P.S.C.H.P Deepika Rani	Zoology	6301476184 drpedapati@gmail.com
16.	Dr G. Vijay Prathap	Zoology	9949611243 Pratapgv504@gmail.com
17.	Dr. Y. Shantiprabha	Zoology	9441269003 santhiprabhay@gmail.com
18.	M. Hima Sridevi	Zoology	9849320443 bollojubaba@gmail.com

Lecturer in charge Dept of Zoology & Aquaculture

DEPARTMENT OF ZOOLOGY & AQUACULTURE

BOARD OF STUDIES – 2026-2027

B. Sc ZOOLOGY

WITH

1.BOS COMMITTEE RESOLUTIONS

2.DEPARTMENT ACTION PLAN

3.CURRICULAR FRAME WORK

4.PROGRAMME OUTCOMES

5.COURSE OUT COMES FOR EACH COURSE

6. CO PO MAPPING

**PITHAPUR RAJAH'S GOVERNMENT COLLEGE (A),
KAKINADA**

Accredited by NAAC with B++Grade

DEPARTMENT OF ZOOLOGY & AQUACULTURE

BOARD OF STUDIES

B.Sc. (Honours) ZOOLOGY

(Single Major System)



CHOICE BASED CREDIT SYSTEM

Convened on 30-06-2026

Index

Sl.No	Name of the Item	Page no.
1	Title page	
2	Proceedings of the BOS	
3	Composition of BOS	
4	Vision and Mission of the College	
5	Agenda	
6	Resolutions	
7	Departmental Action Plan	
8	Credits for each Paper	
9	Programme outcomes	
10	Syllabus with CO-PO mapping	
11	Changes in the syllabus	
12	List of Examiners and Paper setters	

PROCEEDINGS OF THE PRINCIPAL (FAC), PITHAPUR RAJAH's GOVT. COLLEGE [A], KAKINADA
Present: Dr. Kandula Anjaneyulu, M.A, Ph.D.

Rc.No.4/A.C/BOS- UG & PG /2026-27

Dt.17 June 2026

Sub: P.R. Government College (Autonomous), Kakinada – Academic Cell – Conduct of Board of Studies (BoS) Meetings for UG and PG Programmes for the Academic Year 2026–27 – Communication of Guidelines – Regarding.

ORDER:

The autonomous colleges, in alignment with their vision, mission, stated objectives, and core values, are mandated to design and develop their own outcome-based curricula. This must be done with due consideration for societal, local, and global industry requirements, employability, and the development of industry-ready and transferable skills. Accordingly, every programme shall prescribe Course Outcomes (COs), Programme Outcomes (POs), and Programme Specific Outcomes (PSOs) along with a suitable learning outcome assessment management system, supported by a robust and transparent evaluation mechanism to measure attainment levels among students.

Further, the A.P. State Council of Higher Education (APSCHE) has introduced a revised curricular framework effective from the Academic Year 2025-26, incorporating Skill Enhancement Courses, Multi-Disciplinary courses, the Indian Knowledge System and a revised credit structure.

Our institution, from the Academic Year 2022–23 onwards, has defined a renewed vision and mission along with updated objectives and core values, necessitating the design and reorientation of its academic and research administration in line with these directives.

In light of the above responsibilities prescribed by the institution's vision and mission, NEP–2020, NAAC, NIRF, and the APSCHE's revised and new UG and P.G. curricular framework, it is imperative to customize, design, and re-orient our academic and research activities to meet the expectations of students, industries, and government stakeholders.

Accordingly, the Chairpersons of the U.G and P.G Boards of Studies (BoS) of various departments are hereby requested to make necessary arrangements to convene their BoS meetings from **25 June to 30 June 2026**.

The Chairpersons are further instructed to:

1. Prepare the curricula and extracurricular activities for the Academic Year 2026–27 in line with the institution's vision, mission, NEP–2020, and NIRF norms.
2. Devise an appropriate evaluation system to ensure effective learning outcomes and holistic student development.
3. Ensure that the curriculum design includes a **20% revision** of the syllabus each year without deviating from the APSCHE prescribed syllabus.

framed by the BOS committee concerned with duly following the mandate prescribed above.

5. Engage stakeholders viz employers, parents, and alumni, to obtain feedback on the existing curricula and to invite suggestions for improvements.
6. Invite the University nominee, subject experts, industry representatives, student representatives, and parent representatives well in advance. The meeting notice shall clearly specify the date, venue, and agenda, and a soft copy of the agenda and relevant documents shall be circulated for their perusal.
7. Ensure that the subject experts invited preferably hold a Doctorate with at least 10 years of teaching experience and have relevant expertise in designing industry-related, market- and job-oriented curricula.
8. Facilitate thorough deliberations on curriculum design, evaluation methods, incorporation of research components, measures to enhance learning experiences, and optimal utilization of existing human, physical, and ICT resources.
9. Conduct all BoS meetings in offline mode. Online participation shall be permitted only under exceptional circumstances.
10. Prescribe benchmarking and quality initiatives in pedagogy and learning, including strategies for curriculum design and teaching-learning processes, in collaboration with the IQAC Coordinator, prior to the BoS meeting.
11. Ensure that a minimum student attendance of **75%** shall be required for eligibility to appear for I & II Mid-Term Examinations under the CIA component; this shall be formally approved in the BoS meeting.
12. Approve any new programmes to be introduced for the Academic Year 2025–26, the number and frequency of certificate courses, and SWAYAM MOOCs courses.
13. Submit the approved BOS copies in the prescribed format, in **quadruplicate (hard copies)** to the Academic Cell for onward submission to the IQAC, Examination Cell, and Library, within **three days** of the meeting and upload the soft copy in their respective department web pages in the college website.
14. Ensure strict alignment of all recommendations and curriculum changes with the institution's vision and mission.
15. Submit a request to receive advance funds from the Examination cell through Principal for conducting BoS meetings.

Following contents shall be presented in the BOS document in the order

1. Proceedings of the Principal pertaining to BOS
2. Composition of BOS
3. Vision and Mission of the department
4. Agenda: It shall include ATR on the previous BOS meeting first, resolutions, etc., later.
5. Table showing the Allocation of Credits in the following table for both theory and Practicals' in case of science subjects

S. No	Semester	Title of the Course (Paper)	Hrs./week	Max. Marks (SEE)	Marks in CIA	Credits
1	III	Physical Chemistry-I	3	50	50	4

6. Resolutions adopted in the meeting with detailed discussion that took place during the meeting.
7. Each BOS Chairman shall, immediately after syllabus, tabulate the changes made in the syllabus/ paper along with justification.
8. Attendance of Members present with signatures in the tabular form.
9. List of Examiners & Paper setters (Minimum 20 members and at least 02 members from other states)
10. Syllabus for each course (both theory & Practical in case of Science subjects) followed by model question papers (theory & practical) and allocation of CIA (50marks) for each course with structure.
11. Each student (2025-26 AB) has to complete one MOOCS course from SWAYAM in any subject per year.

CIA structure for Single Major system

- Out of 50 marks for CIA, 25 marks are allocated for Mid examinations. In each semester two mid examinations to be conducted and the average of the two will be considered.
- Mid examinations are to be conducted in offline mode at college level
- Mid examination to be conducted in offline mode in which the student should attempt **one essay** question for ten marks out of two questions, **three short** answer questions with five marks each out of five questions
- The remaining 25 marks for CIA are allocated as per the following structure.

Project-10M	Seminar- 5M	Assignment- 5M	Viva on theory- 3M	Clean & green and Attendance- 2M
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The Chairpersons of all Boards of Studies are hereby instructed to comply with these directives in letter and spirit to ensure the highest standards of academic and administrative excellence.



PRINCIPAL
Pithapur Rajah's Government College(A)
Kakinada

Copy to:

1. Lecturers-in-Charge (BOS Chairmen) of all the departments
2. Academic Coordinator
3. IQAC coordinator
4. Controller of Examinations
5. Office

**PROCEEDINGS OF THE PRINCIPAL, P.R. GOVERNMENT COLLEGE(A),
KAKINADA - A.P.**

Present: Dr. Kandula Anjaneyulu M.A., Ph.D.

SUB: P.R. Government College(A), Kakinada-UG Board of Studies (BOS)- Program/Course-M.Sc.,
Zoology Nomination of Members - Orders issued.

REF: Rc.No.4/A.C/BOS- UG & PG /2026-27 Dt.17 June 2026

ORDERS:

The Principal, P.R. Government College(A), Kakinada is pleased to constitute UG Board of Studies in B.SC., ZOOLOGY- for framing the syllabi in respective Subject for all Semesters duly following the norms of the UGC Autonomous guidelines for the AY 2026-27

S. No	Name of the Person	Designation
1	Sri. B. Chakravarthi	Chairman & Lecturer In charge, Department of Zoology & Aquaculture
2	Dr. K. Ramaneeswari	University Nominee, Professor Dept. of Zoology Adikavi Nannaya University, Rajamahendravaram
3	M. Vasantha Lakshmi	Subject Expert -I, Lecturer in Zoology, ASD. Govt. College for women, Kakinada
4	Dr. Durga Rao	Subject Expert – II, Lecturer in Zoology GDC Rajahmundry
5	Dr. P. Rama Mohan rao	Sunrise Aqua labs, Kakinada
6	Dr. Kiran Kumar Pappu	Member
7	Dr. B. Elia	Member
8	M. Satya Vara Lakshmi	Member
9	Dr. T. Venkateswara Rao	Member
10	T. Sushma	Member
11	C. Smyrna	Member
12	V. Ramya	Student Alumni Member
13	Nandini	Student Member II. B.Sc.
14	P. Rami reddy	Student Member I B.Sc

The above members are requested to attend the BoS meeting on 05-02-2026 and share their valuable reviews, and suggestions on the following functionaries.

- Prepare syllabi for the subject keeping in view the objectives of the college, interest of the stake holders and National requirement for consideration and approval of the IQAC and Academic Council.
- Suggested methodologies for innovative teaching and evaluation techniques.
- Suggest the panel of Names to the academic council for appointment of Examiners.
- Coordinate research, teaching, extension and other activities in the Department of the college.


PRINCIPAL
P.R. Govt. College (Autonomous)
KAKINADA-533 001.

APPROVAL LETTERS FROM BOS MEMBERS

AGENDA FOR BOARD OF STUDIES MEETING-2026-2027

30/06/2026

1. Approval of the syllabus for UG B.Sc. (Honours) Zoology Single Major System in accordance with NEP 2020 and Outcome-Based Education (OBE).
2. Approval of Syllabus for all the Semesters and implementation of Choice Based Credit System and to introduce new syllabus for III & IV semesters as per APSCHE for 2025-26 admitted batch (Present II YR B.Sc., Zoology major)
3. Model question papers, Blue Print, Panel of paper setters and examiners.
4. Approval of Teaching–Learning and Evaluation Methodologies, including ICT integration and feedback mechanism
5. Implementation of Skill Enhancement Courses (SEC's) in Zoology by APSCHE through affiliating University for the fifth semester and select one pair of courses based on the choice of majority of the stakeholders.
6. 75% Of Attendance is compulsory to appear for any examination
7. Conduct of guest lectures, field visits, assigning of project works etc.
8. Additional inputs and changes in the curriculum.
9. Continuation of Certificate courses choosing from the entitled Certificate Course on Diseases of Human Importance/Applied and Economic Zoology/Ornamental Fishery/Water quality Assessment/Biodiversity/Diseases of Human importance/AI in teaching and learning Biology
10. Continuous Internal Assessment pattern (CIA)introduced by APCCE
11. Designing and conduct of workshops and seminars
12. Arrangement of skill development, training programmes and MOUs.
13. Conduct of Bridge Course and Remedial Coaching.
14. Approval of new courses introduced in the academic year 2026-27
15. Actionplan2026-2027
16. Any other proposal with the permission of the Chair.

Discussion:

PITHAPUR RAJAH'S GOVT COLLEGE(A), KAKINADA

DEPARTMENT OF ZOOLOGY & AQUACULTURE

BOARD OF STUDIES MEETING (2026-27) CONVENED ON 30 June 2026

The members, Board of Studies, Zoology met through online and offline on 30 June 2026 11.00AM to discuss the agenda points and to approve the course structure, theory and Practical syllabus, Blue Print, Model question papers, Additional inputs in the Curriculum, Study Projects, Co- curricular and extracurricular activities of Department, Skill Development Courses and Certificate Courses offered , Internship programs, Continuous Internal Assessment pattern (CIA) and Semester End examination Pattern.

The following resolutions are made.

Resolution-1

It is resolved to adopt the syllabus for UG B.Sc. (Honours) Zoology Single Major System in accordance with NEP 2020 and Outcome-Based Education (OBE), as prescribed by APSCHE.

Resolution -2

Resolved that the syllabus prescribed under the Single Major System and the Choice Based Credit System (CBCS) introduced by UGC/APSCHE through Adikavi Nannaya University be adopted for Semesters I to VI with effect from the academic year 2023–24.

Further resolved that the syllabus prescribed by APSCHE be implemented in toto for Semesters III and IV during the academic year 2026–27 for students admitted in the academic year 2025–26.

Resolution-3

Resolved to approve the panel of Examiners and Question paper setters, Model papers- and blueprint for all Semesters

Resolution-3

Resolved to implement 50 %external and 50% internal marks for theory exams from the academic year 2021- 22,2023-2024admitted batches, and 60% -40% for 2020-2021 admitted batch as mentioned below and resolved to split up 50marks of internal exams as 25 marks for mid exams and 10 marks for project, 3 marks for viva,5marks for assignment,2 marks for clean and green activity.

	Internal Assessment 50M						Ext' l Assessment
I Mid	II Mid	Project	Viva	Seminar	Assignment	Clean & Green	50 M (2023 admitted Batch)
25M	25M	10	03	05	05	02	
I Mid	II Mid	Project		Seminar	Assignment etc,	Total	50 M (2021 Admitted batch)
25M	25M	10M		5M	10M	50M	
25M	25M			5M	10M	40M	60 M (2020 Admitted batch)

Resolution-4

It is resolved to choose Skill Enhancement Courses (SEC's) 12 ,13, 14A & 15A from the list of Skill Enhancement Courses (SEC's) for V Semester in Zoology for the academic year 2026-2027 as detailed below (Old pattern) for 2024-25 admitted batch

Year	Semester	Course	Title of the Course	No. of Hrs Week	No. of Credits
		12	Poultry Management-I (Poultry Farming)	3	3
			Poultry Management-I (Poultry Farming)	2	1
			Practical Course		
			Poultry Management-II (Poultry	3	3

		13	Production and Management) Poultry Management-II (Poultry Production and Management)Practical Course	2	1
III	V	14 A	Sustainable Aquaculture Management	3	3
			Sustainable Aquaculture Management Practical Course	2	1
		OR			
		14 B	Live Stock Management- I (Biology o Dairy Animals)	3	3
			Live Stock Management- I (Biology o Dairy Animals)Practical Course	2	1
		15 A	Post-Harvest Technology of Fish and Fisheries	3	3
			Post-Harvest Technology of Fish and Fisheries Practical Course	2	1
		OR			
		15 B	Live Stock Management-II (Dairy Production and Management)	3	3
			Live Stock Management-II (Dairy Production and Management)Practical Course	2	1
	VI	Internship			

Resolution-5

Resolved to offer choice-based Skill Development Courses by Department of Zoology entitled Health and Hygiene as SD course in III Semester and ES in V Semester as instructed by APSCHE / AKNU

Resolution-6

Resolved to allow students who have put up 75% of attendance to any examination conducted by the institution. It is also resolved to offer Certificate courses choosing from the entitled list Diseases of Human Importance/Applied and Economic Zoology/Ornamental Fishery/Water quality Assessment/Biodiversity in the academic year 2025-26.

Resolution-7

Resolved to implement the SOPs given by APSCHE for CSP at the end of II semester, and Semester Internship in VI semester.

Resolution-8

Resolved to approve assessment process for CSP, Short-term and semester Internships in the following manner.

First internship (Community Service Project) will be taken up after the I year II semester end examinations or the summer vacation in the intervening 1st and 2nd years of study. The assessment is to be conducted for 100 marks. The number of credits assigned is 4. Later the marks are converted into grades and grade points to include finally in the SGPA and CGPA.

The weightage shall be:

Project Log	20%
Project Implementation	30%
Project report	25%,
Presentation	25%

Second Internship shall be undertaken by the students in the intervening summer vacation between 2nd and 3rd years or after the II-year IV semester end examinations. There will be only internal evaluation for this internship. The assessment is to be conducted for 100 marks and the credits assigned are 4. The marks are converted into grades and grade points to include finally in the SGPA and CGPA.

Project Log	20%
Project report	25%
Presentation	25%

The weightage shall be:

Third internship shall be for the entire VI Semester; the student shall undergo

Apprenticeship / Internship / On the Job Training. The assessment for the Semester long apprenticeship is for 200 marks and credits assigned are 12. The assessment for this internship / on the job training will be both internal and external assessment. The internal assessment will be for 25% of marks which will be continuous and the assessment by the industry/enterprise/organization where the student does his/her internship will be indicated in grades. The Project Presentation is to be made by the student after he/she reports back to the College. Grading given by the Company / Business unit / Enterprise where the student has undergone the training and these grades shall be converted into marks on the scale followed by the University.

The weight age shall be:

Internal Assessment Component	Max. Marks	Marks Awarded
Project Log	10	
Project Implementation	20	
Project Report	10	
Presentation	10	
TOTAL	50	
External Assessment Component	Max. Marks	Marks Awarded
Performance Assessment by the Evaluation Committee, converting the grades awarded by the industry, enterprise, etc	100	
External Viva Voce	50	
Total	150	
Grand Total	200	

Resolution-9

It is resolved to implement 100% external assessment for Skill Development Courses and 100% internal assessment for Certificate Course and resolved to follow the standard operating procedures given by APSCHE through Adikavi Nannaya University for the evaluation of CSP and IV semester Apprenticeship (AnnexureII)

Resolution-10

Resolved to arrange Bridge Course for the newly admitted students and remedial classes for slow learners

Resolution-11

It is resolved to conduct Co- curricular activities like Student Seminars, quiz programmes, elocution, debate, Group discussion, Extension Activities, Study Projects and field trips and to encourage experiential learning and student participation in extracurricular activities of the college.

Resolution-12

Resolved to conduct Student and Staff Exchange Programmes with ASD Government College for Women(A), Kakinada, GDC Rajamahendravaram and SIFT Kakinada as a part of fulfilling the norms of MoU. Resolved to enter MOUs with Industries or training institutes

Resolution-13

It is resolved to take Feedback on Curriculum design and development from Students, Alumni, Teachers, and industry at the end of the semester.

Resolution-14

It is resolved to introduce the following new courses in—B.Sc. (Honours) Zoology, from the AY2026-27 as per the curriculum prescribed by APSCHE for III & IV semesters

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
II	III	5	Genetics	3	3
			Genetics-Practical	2	1
		6	Evolution and Zoogeography	3	3
			Evolution and Zoogeography-Practical	2	1
		7	Animal Physiology: Life Sustaining systems	3	3
			Animal Physiology: Life Sustaining systems-Practical	2	1
	IV	8	Immunology	3	3
			Immunology-Practical	2	1
		9	Animal Biotechnology	3	3
			Animal Biotechnology-Practical	2	1
		10	Wildlife and Conservation Biology	3	3
			Wildlife and Conservation Biology-Practical	2	1

Resolution 15

Resolved to implement the action plan for the academic year 2026-27

		ACTION PLAN 2026-27			
S.No	Activity planned	Date / Period	Outcomes / Objectives	Approximate Budget	Remarks
1	Preparation of Annual Curricular Plans and Pre BOS Meetings	Ist week of June 2026 30 June 2026	*To deliver content in a systematic way * To design, develop and enrich curriculum		
2	*Free Medical Camp for all staff	July IV week	Faculty welfare,	5000	
3	Student seminars *Launch of Certificate Course Invited Lecture	August 2026 August 2026 3 rd week of August 4 th week of August	Student Assessment method Curriculum enrichment Curriculum Enrichment		
4	Field Trips to II- & III-Year students		Experiential Learning	50000	
5	World Mosquito Day *Student Seminars *Field trip to I Year students *Remedial coaching	20 August 2026 Ist week of September II week of September 4 th week of September	Awareness programme Experiential Learning Community service	5000 25000	
6	*Awareness program on Seasonal diseases *Remedial coaching	1 st week of October 2026 October 2026	Extension Activity at nearby schools	5000	
7	*World Fisheries Day	21-11-2026	To highlight the importance of fisheries sector	3000	

	*Student Exchange Programme	4 th week of November	Innovative Teaching Methodology	10000	
8	*Student Training Program at SIFT *Student Seminars	December 2026	Skill Development Assessment & Presentation skills	20000	
9	*Faculty Exchange Program under MOU	January 2027	To Exchange academic resources and Knowledge sharing		
10	*PG CET Coaching	February 2027	Hand holding students for Higher Progression		
11	*Publications By Faculty in UGC Care /Scopus Journals	March 2027	Research/Academic Excellence		
	*Remedial Coaching		Outcome achievement		

Resolution-16

Resolved that the chairman, BOS is authorized to take up necessary amendments, changes, additions, and others as and when required as per the instructions of the UGC, CHE, University, APSCHE and other exigencies if necessary.

PR Government College (A), Kakinada
Department of Zoology & Aquaculture
Consolidated Report of Board of studies in UG Zoology convened on 11-08-2025

S.No	Name of the Person	Designation
1.	Sri.B. Chakravarthi	Chairman & Lecturer Incharge, Department of zoology & Aquaculture
2.	Dr.K. Ramaneswari	University Nominee, Adikavi nannaya University, Rajamahendravaram
3.	Smt. M. Vasantha Lakshmi	Subject Expert: I, Lecturer in Zoology, ASD Govt. college for women (A), Kakinada
4.	Dr. D. Sailaja	Subject Expert: II, Lecturer in Zoology, GDC (A), Rajamahendravaram
5.	Dr.P. RamaMohanRao	Representative from Industry, Aqua industry Consultant
6.	Dr. P. Kiran Kumar	Member
7.	Dr. B. Elia	Member
8.	Ms, M.S.V. Lakshmi	Member
9.	Sri.T.VenkateswaraRao	Member
10.	Y.Gowthami	Member
11.	B. Devi	Member
12.	T.Sushma	Member
13.	C. Smyrna	Member
14.	V.Lakshminarasamma	Alumni
15.	Sanjana	Student Member III B.SC. Zoology
16.	K, Chandini	Student Member II B.SC. Zoology

CURRICULAR FRAMEWORK

Single major System

2025-2026 Admitted Batch onwards

Curriculum Framework for B.Sc (Honours) from A.Y. 2025-26																									
Major+Minor with CSP & 6th sem Internship																									
Semester	Major (4 Cr)			Minor (4 Cr)			AECC (3 Cr)			Multi Disney' (2 Cr)			Skill Enhancement Courses (4Cr/2Cr)			OOTC			(VAC) IKS# Env. Edn* (2 Cr)			Total			
	C	H (T+P)	Cr	C	H (T+P)	Cr	C	H (T+P)	Cr	C	H (T+P)	Cr	C	H (T+P)	Cr	C	H (T+P)	Cr	C	H (T+P)	Cr	C	H (T+P)	Cr	
Sem 1	2	6+4	8				2	8	6				1	4+2	4							5	24	18	
Sem 2	2	6+4	8				2	8	6	1	2	2	1	4+2	4			1#	2	0	7	28	20		
Community Service Project of a minimum of 80 hours with 1 Credits. Student is eligible for Exit Option-1 with the award of Certificate in respective discipline																							1		
Sem 3	3	9+6	12	1	3+2	4	2	8	6	1	2	2	1	2	2						8	32	26		
Sem 4	3	9+6	12	1	3+2	4				1	2	2	1	2	2						6	24	20		
Sem 5	1+2	3+2 6+4	12	2	6+4	8												1*	2	2	6	27	22		
Sem 6	2	6+4	8	2	6+4	8															4	20	16		
Internship/Apprenticeship/OJT a minimum of 180 hours (8 weeks) with 3 Credits. Student is eligible for Exit Option-2 with the award of Degree in respective discipline																							3		
	15		60	6		24	6			18	3		6	4		12			1+1		2	36		126	
Sem 7	3	9+6	12										2	6+4	8	1	2	2	1#	2	0	7	29	22	
Sem 8	3	9+6	12										2	6+4	8	1	2	2	1#	2	0	7	29	22	
4-YR	21		84	6		24	6			18	3		6	8		28	2		4	4		2	50	170	
C	Courses				H	Hours				Cr	Credits				OOTC	Open Online Transdisciplinary									
#	Indian Knowledge Systems - Audit Course										*	Environ Edn													

For Mathematics and Statistics, the number of instructional hours shall be five (5) for courses involving problem-solving, and four (4) for courses comprising only theory.

CURRICULAR FRAMEWORK B.Sc HONOURS FROM THE A.Y. 2025-26
(Major + Minor with CSP & VI Semester Internship)

1st Year - Semester I

Sl.No	Category	Course No	No. of Hours		Total No. of Hours	No. of Credits		Total No. of Credits
			Theory	Practical		Theory	Practical	
1	Major - Core	I	3	2	5	3	1	4
2	Major - Core	II	3	2	5	3	1	4
4	Minor	0	0	0	0	0	0	0
5	AECC - English	I	4	0	4	3	0	3
6	AECC - MIL (Telugu/Hindi/Sanskrit)	I	4	0	4	3	0	3
7	Multidisciplinary Course	0	0	0	0	0	0	0
8	Skill Enhancement Course (SEC) Intro' to Artificial Intelligence	I	4	2 (Practice)	6	4	0	4
End of Semester I of 1st Year		5	18	6	24	16	2	18

1st Year - Semester II

Sl.No	Category	Course No	No. of Hours		Total No. of Hours	No. of Credits		Total No. of Credits
			Theory	Practical		Theory	Practical	
1	Major - Core	III	3	2	5	3	1	4
2	Major - Core	IV	3	2	5	3	1	4
4	Minor	0	0	0	0	0	0	0
5	English	II	4	0	4	3	0	3
6	MIL (Telugu/Hindi/Sanskrit)	II	4	0	4	3	0	3
	Multidisciplinary Course	I	2	0	2	2	0	2
7	Skill Enhancement Course (SEC) Application of Artificial Intelligence (Discipline Specific)	II	4	2 (Practice)	6	4	0	4
8	Indian Knowledge System	I	2	0	2	0	0	0
9	Community Service Project (minimum of 80 hours with 1 Credit)							1
End of Semester II of 1st Year		7	22	6	28	18	3	21

CURRICULAR FRAMEWORK B.Sc HONOURS FROM THE A.Y. 2025-26
(Major + Minor with CSP & VI Semester Internship)

2nd Year - Semester III

Sl. No	Category	Course No	No. of Hours		Total No. of Hours	No. of Credits		Total No. of Credits
			Theory	Practical		Theory	Practical	
1	Major - Core	VI	3	2	5	3	1	4
2	Major - Core	VII	3	2	5	3	1	4
3	Major - Core	VIII	3	2	5	3	1	4
4	Minor	I	3	2	5	3	1	4
5	AECC (Creative Writing/Business Writing in English)	III	4	0	4	3	0	3
6	AECC (Creative Writing/Journalistic Writing in MIL - Telugu/Hindi/Sanskrit)	III	4	0	4	3	0	3
	Multidisciplinary Course	II	2	0	2	2	0	2
7	Skill Enhancement Course (SEC) Design Thinking/Problem Solving / Others	III	2	0	2	2	0	2
End of Semester III of 2nd Year		8	24	8	32	22	4	26

2nd Year - Semester IV

Sl. No	Category	Course No	No. of Hours		Total No. of Hours	No. of Credits		Total No. of Credits
			Theory	Practical		Theory	Practical	
1	Major - Core	IX	3	2	5	3	1	4
2	Major - Core	X	3	2	5	3	1	4
3	Major - Core	XI	3	2	5	3	1	4
4	Minor	II	3	2	5	3	1	4
	Multidisciplinary Course	IV	2	0	2	2	0	2
7	Skill Enhancement Course (SEC) Design Thinking/Problem Solving / Others	IV	2	0	2	2	0	2
End of Semester IV of 2nd Year		6	16	8	24	16	4	20

CURRICULAR FRAMEWORK B.Sc HONOURS FROM THE A.Y. 2025-26 (Major + Minor with CSP & VI Semester Internship)								
3rd Year - Semester V								
Sl.No	Category	Course No	No. of Hours		Total No. of Hours	No. of Credits		Total No. of Credits
			Theory	Practical		Theory	Practical	
1	Major - Core	V	3	2	5	3	1	4
2	Major - Elective	XII	3	2	5	3	1	4
3	Major - Elective	XIII	3	2	5	3	1	4
4	Minor	III	3	2	5	3	1	4
5	Minor	IV	3	2	5	3	1	4
6	Environmental Education	I	2	0	2	2	0	2
End of Semester V of 3rd Year		6	17	10	27	17	5	22
3rd Year - Semester VI								
Sl.No	Category	Course No	No. of Hours		Total No. of Hours	No. of Credits		Total No. of Credits
			Theory	Practical		Theory	Practical	
1	Major - Elective	XIV	3	2	5	3	1	4
2	Major - Elective	XV	3	2	5	3	1	4
3	Minor	VII	3	2	5	3	1	4
4	Minor	VIII	3	2	5	3	1	4
5	Semester Internship (minimum of 180 hours with 3 Credits)							3
End of Semester VI of 3rd Year		4	12	8	20	12	7	19

Credit Framework for 3-year UG Program

Credits for Major - $11 \times 4 = 44 + 4 \times 4 = 16$. Total 60 Credits

Credits for Minor - $6 \times 4 = 24$ Credits

Credits for AECC (Languages) - $3 \times 3 = 9$ for Eng + $3 \times 3 = 9$ for MIL. Total = 18

Credits for Multidisciplinary Courses - $3 \times 2 = 6$ Credits

Credits for Skill Enhancement Courses - $2 \times 4 = 8$ for AI + 2×2 for others. Total 12 Credits

Credits for Value Added Courses - Env.Edn 2 Credits

Credits for Internships - 4 Credits

TOTAL CREDITS FOR 3-YEAR UG PROGRAMME - 126 Credits.

For Mathematics and Statistics, the number of instructional hours shall be five (5) for courses involving problem-solving, and four (4) for courses comprising only theory.



ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION

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

COURSE STRUCTURE (for Semester I to VI)

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
I	I	1	Animal Diversity-I Biology of Non- Chordates	3	3
			Animal Diversity-I Biology of Non- Chordates-Practical	2	1
		2	Animal Diversity-II Biology of Chordates	3	3
			Animal Diversity-II Biology of Chordates-Practical	2	1
	II	3	Cell and Molecular Biology	3	3
			Cell and Molecular Biology-Practical	2	1
		4	Embryology	3	3
			Embryology-Practical	2	1
II	III	5	Plant Diversity-I Biology of Non- Angiosperms	3	3
			Plant Diversity-I Biology of Non- Angiosperms-Practical	2	1
		6	Plant Diversity-II Biology of Angiosperms	3	3
			Plant Diversity-II Biology of Angiosperms-Practical	2	1
		7	Plant Diversity-III Biology of Gymnosperms	3	3
			Plant Diversity-III Biology of Gymnosperms-Practical	2	1
	IV	8	Plant Diversity-IV Biology of Pteridophytes	3	3
			Plant Diversity-IV Biology of Pteridophytes-Practical	2	1
		9	Plant Diversity-V Biology of Mosses	3	3
			Plant Diversity-V Biology of Mosses-Practical	2	1
		10	Plant Diversity-VI Biology of Fungi	3	3
			Plant Diversity-VI Biology of Fungi-Practical	2	1
III	V	11	Economic Zoology	3	3
			Economic Zoology-Practical	2	1

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
		12 A	Biology of Fin Fish & Shell Fish	3	3
			Biology of Fin Fish & Shell Fish-Practical	2	1
		OR			
		12 B	Poultry Products and Management	3	3
			Poultry Products and Management-Practical	2	1
		OR			
		12 C	Mulberry and Silk Worm Rearing	3	3
			Mulberry and Silk Worm Rearing-Practical	2	1
		OR			
		12 D	Basics of Bioinformatics and Computational Tools Course	3	3
			Basics of Bioinformatics and Computational Tools Course-Practical	2	1
		OR			
		12 E	Milk and Milk Products Technology	3	3
			Milk and Milk Products Technology-Practical	2	1
		13 A	Sustainable Aquaculture	3	3
			Sustainable Aquaculture-Practical	2	1
		OR			
		13 B	Poultry Waste Management	3	3
			Poultry Waste Management-Practical	2	1
		OR			
		13 C	Silk Technology	3	3
			Silk Technology-Practical	2	1
		OR			
		13 D	Molecular Biology and Genetic Technology	3	3
			Molecular Biology and Genetic Technology-Practical	2	1
		OR			
		13 E	Milk, Meat Hygiene, Food Safety and Public Health	3	3
			Milk, Meat Hygiene, Food Safety and Public Health-Practical	2	1
	VI	14 A	Ornamental Fishery	3	3
			Ornamental Fishery-Practical	2	1
		OR			

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
		14 B	Poultry Economics and Marketing	3	3
			Poultry Economics and Marketing-Practical	2	1
		OR			
		14 C	Therapeutic and Cosmetic Applications	3	3
			Therapeutic and Cosmetic Applications-Practical	2	1
		OR			
		14 D	Biostatistics and Programming for Life Sciences	3	3
			Biostatistics and Programming for Life Sciences-Practical	2	1
		OR			
		14 E	Livestock Economics, Marketing and Business Management	3	3
			Livestock Economics, Marketing and Business Management-Practical-Practical	2	1
		15 A	Post Harvest Technology of Fish and Fisheries	3	3
			Post Harvest Technology of Fish and Fisheries-Practical	2	1
		OR			
		15 B	Poultry Entrepreneurship	3	3
			Poultry Entrepreneurship-Practical	2	1
		OR			
		15 C	Sericulture Marketing and Entrepreneurship	3	3
			Sericulture Marketing and Entrepreneurship-Practical	2	1
		OR			
		15 D	Genomics, Proteomics- Applications in Zoology	3	3
			Genomics, Proteomics- Applications in Zoology-Practical	2	1
		OR			
		15 E	Livestock Entrepreneurship	3	3
			Livestock Entrepreneurship-Practical	2	1

Note: In the III Year (during the V and VI Semesters), students are required to select a pair of electives from one of the **Five** specified domains. **For example: if set ‘A’ is chosen, courses 12 to 15 to be chosen as 12 A, 13 A, 14 A and 15 A.** To ensure in-depth understanding and skill development in the chosen domain, students must continue with the same domain electives in both the V and VI Semesters.

Single major System

III & IV Semesters

2025-2026 Admitted Batch onwards

B.Sc. Honours Zoology with Minor

III Semester Structure

2025-2026 admitted Batch

S. No	Subject/ paper	Title	Total hrs /week	No. of Credits	Remarks
1.	Course V	Genetics	3+2= 5 Hrs	3+2	
2.	Course VI	Evolution & Zoo geography	3+2= 5 Hrs	3+2	
3	Course VII	Animal Physiology: Life Sustaining systems	3+2= 5 Hrs	3+2	
4	Minor I	Animal Diversity-I Biology of Non-Chordates	3+2= 5 Hrs	3+2	
5	First Language	English	3 Hrs	4	
6	Second Language	Tel/San/Hindi	3 Hrs	4	
7	Skill Courses (1Paper)	ICT 	2+2= 4 Hrs	2+2	A student must choose any one course

8	MDC		
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B.Sc. Honours Zoology with Minor
IV Semester Structure
2025-2026 admitted Batch

S. No	Subject/ paper	Title	Total hrs /week	No. of Credits	Remarks
1.	Course VIII	Immunology	3+2= 5 Hrs	3+2	
2.	Course IX	Animal Biotechnology	3+2= 5 Hrs	3+2	
3	Course X	Wildlife and Conservation Biology	3+2= 5 Hrs	3+2	
4	Minor II	Animal Diversity-II Biology of Chordates	3+2= 5 Hrs	3+2	
5	Skill Course		2+2= 4 Hrs	2+2	A student must choose any one course
6	MDC				

2024-2025 ADMITTED BATCH

B.Sc (Honours) with Single Major																									
Semester	Major* (4 Cr)			Minor (4 Cr)			AECC (3 Cr) <i>Lay</i>			Multi Disney' (2 Cr)			Skill Enhanceme nt Courses (2Cr)			OOTC			Env. Edn (2 Cr)			Total			
	C	H	Cr	C	H	Cr	C	H	Cr	C	H	Cr	C	H	Cr	C	H	Cr	C	H	Cr	C	H	Cr	
Sem 1	2*	10	8				2	8	6	1	2	2	2	6	4							7	26	20	
Sem 2	2	10	8	1	3+2	4	2	8	6				2	6	4							7	29	22	
Community Service Project of 180 hours with 4 Credits.																									
Student is eligible for Exit Option-1 with the award of Certificate in respective discipline																									
Sem 3	4	12+8	16	1	3+2	4				1	2	2	1	2	2							7	29	24	
Sem 4	3	9+6	12	2	6+4	8				1	2	2	1	2	2							7	29	24	
Short-Term Internship/Apprenticeship/OJT of 180 hours with 4 Credits.																									
Student is eligible for Exit Option-2 with the award of Diploma in respective major with minor																									
Sem 5	4	12+8	16	2	6+4	8													1	2	2	7	32	26	
Sem 6	Semester Internship/Apprenticeship/OJT with 12 Credits.																								
Student is eligible for Exit Option-3 with the award of Degree in respective major																									
																			IKS#						
Sem 7	3	9+6	12										2*	6+4	8	1	2	2	1	2	0	6	29	22	
Sem 8	3	9+6	12										2*	6+4	8	1	2	2	1	2	0	6	29	22	
	21		84	6		24	4		12	3	6	6	10	32	28	2	4	4	2	4	0	47		160	
20 Additional Credits for 10 month mandatory Internship/OJT/Apprenticeship																									
C Courses					H Hours					Cr Credits					OOTC Open Online Transdisciplinary										
IKS# Indian Knowledge Systems - Audit Course																									

ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION

Programme: B.Sc. Honours in Zoology (Major)

w.e.f. AY 2023-24

COURSE STRUCTURE

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
I	I	1	Introduction to Classical Biology	3+2	4
	I	2	Introduction to Applied Biology	3+2	4
	II	3	Animal Diversity-I Biology of Non-Chordates	3	3
			Animal Diversity-I Biology of Non-Chordates Practical Course	2	1
	II	4	Cell and Molecular Biology	3	3
			Cell and Molecular Biology Practical Course	2	1
	III	5	Animal Diversity-II Biology of Chordates	3	3
			Animal Diversity-II Biology of Chordates Practical Course	2	1
		6	Principles of Genetics	3	3
			Principles of Genetics Practical Course	2	1
		7	Animal Biotechnology	3	3
			Animal Biotechnology Practical Course	2	1
		8	Evolution and Zoogeography	3	3
			Evolution and Zoogeography Practical course	2	
		9	Embryology	3	
			Embryology Practical Course	2	

II		10	Animal Physiology: Life Sustaining Systems	3	

	IV		Animal Physiology: Life Sustaining Systems Practical Course	2	
		11	Immunology	3	
			Immunology Practical Course	2	1

Year	Semester	Course	Title of the Course	No. of Hrs Week	No. of Credits
III	V	12	Poultry Management-I (Poultry Farm ng)	3	3
			Poultry Management-I (Poultry Farm ng)	2	1
			Practical Course		
		13	Poultry Management-II (Poultry	3	3
			Production and Management)		
			Poultry Management-II (Poultry	2	1
			Production and Management)Practical		
			Course		
		14 A	Sustainable Aquaculture Management	3	3
			Sustainable Aquaculture Management	2	1
			Practical Course		
		OR			
		14 B	Live Stock Management- I (Biology o	3	3
			Dairy Animals)		
			Live Stock Management- I (Biology o	2	1
			Dairy Animals) Practical Course		
		15 A	Post-Harvest Technology of Fish and	3	3
			Fisheries		
			Post-Harvest Technology of Fish and	2	1
			Fisheries Practical Course		
		OR			
		15 B	Live Stock Management-II (Dairy	3	3
			Production and Management)		
			Live Stock Management-II (Dairy	2	1
			Production and Management) Practic		
			Course	1	
	VI	Internship			

SEMESTER V
COURSE STRUCTURE FOR 2024-25 ADMITTED BATCH
(III YEAR- 2026-27)

S. No	Subject/ paper	Title	Total hrs /week	No. of Credits	Remarks
1.	Course XII/ Minor V	Poultry Management-I (Poultry Farming)	3+2= 5 Hrs	3+2	
2.	Course XIII/ Minor VI	Poultry Management-II (Poultry Production and Management)	3+2= 5 Hrs	3+2	
3	Course XIV A	Sustainable Aquaculture Management	3+2= 5 Hrs	3+2	
4	Course XV A	Postharvest Technology of fish and fisheries	3+2=5hrs	3+2	
5	Minor	Poultry Management-I (Poultry Farming)	3+2=5hrs	3+2	
6	Minor	Poultry Management-II (Poultry Production and Management)	3+2=5hrs	3+2	
7	Skill Courses (2 Papers)		2+2= 4 Hrs	2+2	A student must choose any TWO of four courses

B.Sc. Honours- Zoology IV Year

AP STATE COUNCIL OF HIGHER EDUCATION REVISED UG SYLLABUS UNDER CBCS

(Implemented from Academic Year 2020-21)

PROGRAMME: FOUR YEAR B.Sc. (Hons)

Domain Subject: ZOOLOGY

Courses for Semesters VII& VIII

(Syllabus with Learning Outcomes, References, &Co-curricular Activities)

Higher Order Courses for semester-VII

(To choose any three of the following courses Course no	Course Title (Theory + Lab)		Marks	Credits
Choose any THREE Courses	8A	ENDOCRINOLOGY	100+50	4+1
8B	DEVELOPMENTAL BIOLOGY AND REPRODUCTIVE TECHNOLOGIES		100+50	4+1
8C	PARASITOLOGY		100+50	4+1
8D	HUMAN HEALTH AND INFECTIOUS DISEASES		100+50	4+1
8E	BIODIVERSITY AND SYSTEMATICS		100+50	4+1
8F	WILDLIFE AND CONSERVATION BIOLOGY		100+50	4+1

Skill Enhancement Courses for Semester–VII

29

(To choose one pair from the four alternate pairs of SECs) Course no	Course Title (Theory + Lab)	Marks	Credits
9A	HATCHERY TECHNOLOGY IN AQUATIC ORGANISMS	100+50	4+1
9B	FISH NUTRITION AND FEED TECHNOLOGY	100+50	4+1
(OR)			
10A	MILK AND MILK PRODUCTS TECHNOLOGY	100+50	4+1
10B	MILK AND MEAT HYGIENE, FOOD SAFETY AND PUBLIC HEALTH	10	4+1
(OR)			
11A	POULTRY PRODUCTS AND MANAGEMENT	100+50	4+1
11 B	POULTRY WASTE MANAGEMENT	100+50	4+1
(OR)			
12 A	MULBERRY PHYSIOLOGY AND MULBERRY BREEDING & GENETICS	100+50	4+1
12 B	SILKWORM PHYSIOLOGY AND SILKWORM BREEDING & GENETICS	100+50	4+1
13	ONE ONLINE COURSE FROM ANY DISCIPLINE	100+50	

Of the 6 courses in Semesters VII, 5 courses (3+2) are Subject related and 1 course shall mandatorily be OPEN ONLINE COURSE in any discipline, encouraging trans disciplinary

Higher Order Courses for semester-VIII

(To choose any three of the following combination) Choose any THREE Courses	Course no	Course Title (Theory + Lab)	Marks	Credits
14 A	TOOLS AND TECHNIQUES IN BIOLOGY	100+50	4+1	
14 B	TOXICOLOGY AND BIOSTATISTICS	100+50	4+1	
14 C	ENVIRONMENT BIOLOGY AND ENVIRONMENT PHYSIOLOGY	100+50	4+1	
14 D	ANIMAL BEHAVIOUR AND CHRONOBIOLOGY	100+50	4+1	
14 E	MOLECULAR AND HUMAN GENETICS	100+50	4+1	
14 F	BIOSYSTEMATICS & TAXONOMY	100+50	4+1	

Skill Enhancement Courses for Semester–VIII

(To choose one pair from the four alternate pairs of SECs) Course no.	Course Title (Theory + Lab)	Marks	Credits
15 A	MARICUTLURE	100+50	4+1
15 B	ORNAMENTAL FISHERY	100+50	4+1
(OR)			
16 A	LIVESTOCK ECONOMICS, MARKETING & BUSINESS MANAGEMENT	100+50	4+1
16 B	LIVESTOCK ENTREPRENEU SHIP	100+50	4+1
(OR)			
17 A	POULTRY ECONOMICS, MARKETING AND INTEGRATION	100+50	4+1
17 B	POULTRY ENTERPRENUE SHIP	100+50	4+1
(OR)			
18 A	SERICULTURE MARKETING	100+50	4+1

18 B	SERICULTURE ENTREPRENUE SHIP HUMAN RESOURCE DEVELOPMENT	100+50	4+1
19	ONE ONLINE COURSE FROM ANY DISCIPLINE	5	

Of the 6 courses in Semesters VIII, 5 courses (3+2) are Subject related and 1 course shall mandatorily be OPEN Online course in any discipline, encouraging trans disciplinary learning.

PROGRAMME OUTCOMES (POS)

B.SC. ZOOLOGY (SINGLE MAJOR)

PO1. Knowledge of Zoological Sciences

Acquire comprehensive knowledge of animal diversity, taxonomy, anatomy, physiology, genetics, cell biology, developmental biology, ecology, evolution, biotechnology, and applied zoology.

PO2. Scientific Inquiry and Critical Thinking

Develop the ability to apply scientific principles, analytical reasoning, and critical thinking to understand biological phenomena and solve zoological problems.

PO3. Practical and Laboratory Skills

Demonstrate proficiency in laboratory techniques, specimen identification, microscopy, histology, dissection, molecular biology techniques, field studies, and data collection relevant to zoological sciences.

PO4. Research Competency

Design, conduct, analyze, and interpret biological experiments using appropriate scientific methodologies, statistical tools, and ethical research practices.

PO5. Biodiversity Conservation and Environmental Awareness

Understand the importance of biodiversity conservation, wildlife management, ecosystem sustainability, and environmental protection, and apply these principles in addressing ecological challenges.

PO6. Application of Modern Biological Technologies

Utilize contemporary tools and techniques such as bioinformatics, biotechnology, molecular genetics, immunology, and animal cell culture in biological research and industry.

PO7. Communication and Scientific Documentation

Communicate scientific concepts, experimental findings, and research outcomes effectively through oral presentations, scientific writing, digital platforms, and teamwork.

PO8. Professional Ethics and Social Responsibility

Demonstrate ethical conduct in scientific research, animal handling, environmental stewardship, and professional practice while contributing responsibly to society.

PO9. Employability and Entrepreneurship

Develop competencies for careers in education, research, healthcare, wildlife conservation, fisheries, animal husbandry, biotechnology, environmental management, and entrepreneurship.

PO10. Lifelong Learning and Innovation

Cultivate self-directed learning, adaptability, innovation, and continuous professional development to meet emerging challenges in biological sciences and allied disciplines.

**PR Government College (A),
Kakinada SEMESTER-I**

COURSE 1: ANIMAL DIVERSITY-I BIOLOGY OF NON-CHORDATES

**Theory
hrs/week**

Credits: 3

3

COURSE OBJECTIVES:

- To understand the taxonomic position of protozoa to helminths.□
- To understand the general characteristics of animals belonging to Protozoa to Hemichordate. □
- To understand the structural organization of animals phylum from protozoa to Hemi Chordata. □
- To understand the origin and evolutionary relationship of different phyla from Protozoa to Hemi Chordata.□
- To understand the origin and evolutionary relationship of different phylum from annelids to hemichordates.□

LEARNING OUTCOMES:

By the completion of the course student will able to –

- Describe concept of animal kingdom classification and general characters of Protozoa□
- Classify Porifera and Coelenterata with taxonomic keys□
- Classify Phylum Platy & Nematelminthes using examples, parasitic adaptation□
- Describe Phylum Annelida & Arthropoda using examples and economic importance
- Describe Mollusca, Echinodermata & Hemichordata with suitable examples in relation to the phylogeny

SYLLABUS:

UNIT-I

- 1.1 Whittaker's five kingdom concept and classification of Animal Kingdom.
- 1.2 Protozoa General Characters and classification up to classes with suitable examples
- 1.3 Protozoa Locomotion & nutrition 1.4 Protozoa reproduction

Activity: Assignment /Seminar on the above

Evaluation: Marks to be awarded for written and oral presentations

UNIT –II

- 2.1 Porifera General characters and classification up to classes with suitable examples
- 2.2 Canal system in sponges
- 2.3 Coelenterata General characters and classification up to classes with suitable examples
- 2.4 Polymorphism in coelenterates & Corals and coral reefs

Activity: Assignment /Seminar /Quiz/Project on the above

**Evaluation: Evaluation of Written part Evaluation of oral Presentation,
Assessment of students in Quiz participation and Ranking - Evaluation of
Project Report and oral
presentation**

UNIT – III

- 3.1 Platyhelminthes General characters and classification up to classes with suitable examples
- 3.2 Parasitic Adaptations in helminths
- 3.3 Nematelminthes General characters and classification up to classes with suitable examples
- 3.4 Life cycle and pathogenicity of *Ascaris lumbricoides*

Activity: Assignment /Seminar /Quiz/Project/Peer teaching on the above

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT – IV

- 4.1 Annelida General characters and classification up to classes with suitable examples
- 4.2 Vermiculture - Scope, significance, earthworm species, processing, Vermicompost, economic importance of vermicompost
- 4.3 Arthropoda General characters and classification up to classes with suitable examples
- 4.4 *Peripatus* - Structure and affinities

Activity: Assignment /Seminar /Quiz/Project/Peer teaching on the above

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT – V

- 5.1 Mollusca General characters and classification up to classes with suitable examples
- 5.2 Pearl formation in Pelecypoda
- 5.3 Echinodermata General characters and classification up to classes with suitable examples Water vascular system in star fish
- 5.4 Hemichordata General characters and classification up to classes with suitable examples *Balanoglossus* - Structure and affinities

Activity: Assignment /Seminar /Quiz/Project/Peer teaching on the above

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

CO-CURRICULAR ACTIVITIES:

- Preparation of chart/model of phylogenic tree of life, 5-kingdom classification □
- Visit to Zoology Museum or Coral Island as part of Zoological tour □
- Charts on polymorphism □
- Clay models of canal system in sponges □
- Plaster-of-paris model of *Peripatus* □
- Construction of a vermicompost in each college, manufacture of manure by students and donating to local farmers □
- Chart on pearl forming layers using clay □
- Visit to a pearl culture rearing industry/institute □
- Live model of water vascular system □
- Observation of *Balanoglossus* for its tubicolous habit □

REFERENCE BOOKS:

- L.H. Hyman „*The Invertebrates*’ Vol I, II and V. – M.C. Graw Hill Company Ltd. □
- Kotpal, R.L. 1988 - 1992 Protozoa, Porifera, Coelenterata, Helminthes, Arthropoda, Mollusca, Echinodermata. Rastogi Publications, Meerut. □
- E.L. Jordan and P.S. Verma „*Invertebrate Zoology*’ S. Chand and Company. □

- R.D. Barnes „*Invertebrate Zoology*’by: W.B. Saunders CO., 1986. □
- Barrington. E.J.W., „*Invertebrate structure and Function*’by ELBS. □
- P.S. Dhami and J.K. Dhami. *Invertebrate Zoology*. S. Chand and Co. New Delhi. □
- Parker, T.J. and Haswell “*A text book of Zoology*’ by, W.A., Mac Millan Co. London. □
- Barnes, R.D. (1982). *Invertebrate Zoology*, V Edition” □

CO-PO Mapping:

(1: Slight [Low] 2: Moderate [Medium];3: Substantial [High], : 0 : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	2	2	1	2	1	3	2	3	2	1	2	2
CO2	2	1	3	2	1	1	2	3	1	1	2	2	2
CO3	1	1	2	3	3	1	1	1	2	3	1	2	1
CO4	3	2	3	2	2	2	1	2	1	2	2	1	2
CO5	1	2	1	1	1	2	2	1	1	1	1	1	2

Pithapur Rajah's Govt. College (A) Kakinada.

DEPARTMENT OF ZOOLOGY

SEMESTER I - ZOOLOGY - COURSE I

ANIMAL DIVERSITY-I BIOLOGY OF NON-CHORDATES

BLUE PRINT

Time: 2 hrs

Max. Marks: 50

Unit	Essay	Short
I	1	1
II	1	1
III	1	2
IV	1	1
V	2 Out of 6, 3 questions should be answered 3X10=30M	2 Out of 7, 4 questions should be answered 4X5=20M

Pithapur Rajah's Govt. College (A) Kakinada.
MODEL QUESTION PAPER
I SEMESTER - ZOOLOGY - PAPER - I
COURSE I: ANIMAL DIVERSITY-I BIOLOGY OF NON-CHORDATES

Time: 2 hrs

Max. Marks: 50

SECTION - A

- I. Answer any THREE of the following. Choosing at least one from each part. Draw labeled diagrams wherever necessary**

3x10=30 M

PART- I

1. What is the Whittaker's Five Kingdom concept and how does it classify the animal kingdom? BT1
2. Describe the Canal system in sponges BT2
3. Explain Parasitic Adaptations in Helminthes BT1

PART- II

4. Explain preparation and economic importance of Vermicompost. BT1
5. Describe the Pearl formation in Pelecypoda BT2
6. Describe the Water vascular system in star fish BT2

SECTION - B

- II. Answer any FOUR of the following:**

Draw labeled diagrams wherever necessary

4x5=20 M

7. Asexual reproduction in protozoa BT1
8. coral reefs BT2
9. Trematoda BT2
10. Pathogenicity of Ascaris BT3
11. Insecta BT2
12. Gastropoda BT1
13. Affinities of Balanoglossus BT4

QUESTION BANK ANIMAL DIVERSITY I- BIOLOGY OF NON-CHORDATES

Essay questions

UNIT – I

1. What is the Whittaker's Five Kingdom concept and how does it classify the animal kingdom.
2. Describe the general characters and classification of Protozoa up to classes with suitable examples.
3. Give an account of locomotion, nutrition, and reproduction in Protozoa.
4. Give an account of nutrition in Protozoa.
5. Explain sexual reproduction in Protozoa

UNIT – II

6. Describe the general characters and classification of Porifera up to classes with suitable examples.
7. Explain the canal system in sponges and its significance.
8. Discuss polymorphism in Coelenterates and add a note on corals and coral reefs

UNIT – III

9. Write an essay on the general characters and classification of Platyhelminthes up to classes with suitable examples.
10. Describe the parasitic adaptations in helminths.
11. Explain the life cycle and pathogenicity of *Ascaris lumbricoides*.

UNIT – IV

12. Give an account of the general characters and classification of Annelida up to classes with suitable examples.
13. Explain preparation and economic importance of Vermicompost
14. Describe the structure and affinities of Peripatus.

UNIT – V

15. Explain the general characters and classification of Mollusca up to classes with suitable examples.
16. Describe the process of pearl formation in Pelecypoda.
17. Write an essay on the water vascular system in Starfish
18. Discuss the affinities of Balanoglossus.

Short Answer questions

UNIT I

1. Whittaker's five kingdom system
2. Asexual reproduction in protozoa
3. Types of locomotory organelles in Protozoa

UNIT II

4. Asconoid type of canal system
5. Polyp and medusa
6. coral reefs

UNIT III

7. Parasitic adaptations
8. Turballeria
9. Ascaris lumbricoides

UNIT IV

10. Role of earthworms in soil fertility
11. Vermicomposting
12. Insecta
13. Peripatus

UNIT V

14. Economic importance of Molluscs
15. Functions of the water vascular system in starfish
16. Affinities and position of Balanoglossus

SEMESTER-I

COURSE 1: ANIMAL DIVERSITY-I BIOLOGY OF NON-CHORDATES

Practical

Credits: 1

2 hrs/week

COURSE 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. Study of museum slides / specimens / models (Classification of animals up to orders)
2. Protozoa: Amoeba, *Paramoecium*, *Paramoecium* Binary fission and Conjugation, *Vorticella*, *Entamoeba histolytica*, *Plasmodium vivax*
3. Porifera: *Sycon*, *Spongilla*, *Euspongia*, *Sycon*- T.S & L.S, Spicules, Gemmule
4. Coelenterata: *Obelia* – Colony & Medusa, *Aurelia*, *Physalia*, *Velella*, *Corallium*, *Gorgonia*, *Pennatulula*
5. Platyhelminthes: *Planaria*, *Fasciola hepatica*, *Fasciola* larval forms – *Miracidium*, *Redia*, *Cercaria*, *Echinococcus granulosus*, *Taenia solium*, *Schistosoma haematobium*
6. Nematelminths: *Ascaris* (Male & Female), *Drancunculus*, *Ancylostoma*, *Wuchereria*
7. Annelida: *Nereis*, *Aphrodite*, *Chaetopteurs*, *Hirudinaria*, Trochophore larva
8. Arthropoda: *Cancer*, *Palaemon*, *Scorpion*, *Scolopendra*, *Sacculina*, *Limulus*, *Peripatus*,
9. Larvae - Nauplius, Mysis, Zoea, Mouth parts of male & female *Anopheles* and *Culex*, Mouthparts of Housefly and Butterfly.
10. Mollusca: *Chiton*, *Pila*, *Unio*, *Pteredo*, *Murex*, *Sepia*, *Loligo*, *Octopus*, *Nautilus*, Glochidium larva
11. Echinodermata: *Asterias*, *Ophiothrix*, *Echinus*, *Clypeaster*, *Cucumaria*, *Antedon*, *Bipinnaria* larva
12. Hemichordata: *Balanoglossus*, *Tornaria* larva

Dissections:

Computer - aided techniques should be adopted or show virtual dissections Dissection of edible (Prawn/Pila) invertebrate as per UGC guidelines

An “Animal album” containing photographs, cut outs, with appropriate write up about the above- mentioned taxa. Different taxa/ topics may be given to different sets of students for this purpose

REFERENCE WEB LINKS:

- <https://virtualmicroscopy.peabody.yale.edu/>□
- <https://tnhm.in/category/assorted-gallery-for-vertebrates-and-invertebrates/invertebrates/>□
- <http://www.nhc.ed.ac.uk/index.php?page=24.25.312> □

- <https://biologyjunction.com/invertebrate-notes/> □
- <https://lanwebs.lander.edu/faculty/rsfox/invertebrates/> □
- <https://www.youtube.com/watch?v=iqrVmz625WA> □
- <https://www.youtube.com/watch?v=5VIJ59oX7G0> □
- <https://www.youtube.com/watch?v=sMutOON6zHE> □ □
- <https://www.youtube.com/watch?v=zSTYRtliac0> □

COURSE I

ANIMAL DIVERSITY-I BIOLOGY OF NON- CHORDATES

Practical Model question paper

Time 2 hrs

Max marks : 50

- I. Identify the following specimens or spotters & slides, draw neat labeled diagram. Write notes on---
- 6x5=30M

- 1- Paramecium
- 2- Euspongia
- 3- Physalia
- 4- Fasciola hepatica
- 5- Ascaris
- 6- Hirudinaria

- II. Dissect and draw the labeled diagram of Prawn Nervous system 1x10=10 M

- III. Practical Record 5M

- IV. Viva-voce

PR Government College (A), Kakinada SEMESTER-I

COURSE 2: ANIMAL DIVERSITY-II BIOLOGY OF CHORDATES

Theory

Credits: 3

3 hrs/week

COURSE OBJECTIVES:

- To understand the animal kingdom.□
- To understand the taxonomic position of Protochordata to Mammalia.□
- 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.□

LEARNING OUTCOMES:

By the completion of the course student will able to –

- Describe general taxonomic rules on animal classification of chordates□
- Classify Protochordata to Mammalia 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 to Mammalia.□

SYLLABUS:

UNIT - I

1.1 General characters and classification of Chordata up to classes

1.1 Salient features of Cephalochordata, Salient features of Urochordata

1.2 Structure and life history of *Herdmania*, Retrogressive metamorphosis –Process and Significance

1.3 Cyclostomata, General characters, Comparison of Petromyzon and Myxine

Activity: Model preparation /Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT - II

- 2.1 General characters of Fishes, Salient features 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

Activity: *Model preparation /Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above*

Evaluation: *Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity*

UNIT - 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

Activity: *Model preparation /Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above*

Evaluation: *Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity*

UNIT - IV

- 4.1 General characters of Aves
- 4.2 *Columba livia*: External features, Digestive system, Respiratory system
- 4.3 *Columba livia*: Structure and function of Heart, structure and function of Brain
- 4.4 Migration in Birds, Flight adaptation in birds

Activity: *Model preparation/Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above*

Evaluation: *Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity*

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

Activity: *Model preparation/Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above*

Evaluation: *Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity*

CO-CURRICULAR ACTIVITIES

- 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. Ekambaranatha Ayyar, 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.

CO-PO Mapping

1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], 0 : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	1	2	2	1	2	1	3	2	3	2	1	2	2
CO2	2	1	3	2	1	1	2	3	1	1	2	2	2
CO3	1	1	2	3	3	1	1	1	2	3	1	2	1
CO4	2	2	3	2	2	2	1	2	1	2	2	1	2
CO5	1	2	1	1	1	2	2	1	1	1	1	1	2

QUESTION BANK

UNIT-I ESSAY QUESTIONS

S.No.	QUESTION	BT LEVE L	CO	PO
1	Explain the life history of Herdmania	BT1	CO1	PO2
2	Describe the process of retrogressive metamorphosis and its significance	BT1	CO1	PO2
3	Illustrate the comparison between Petromyzon and Myxine	BT2	CO1	PO2

SHORT QUESTIONS

S.No.	QUESTION	BT LEVEL	CO	PO
1	Urochordata	BT2	CO2	PO2
2	Cephalochordata	BT2	CO1	PO1
3	Cyclostomata	BT1	CO2	PO2

UNIT-II
ESSAY QUESTIONS

S.No.	QUESTION	BT LEVEL	CO	PO
1	Explain the process of migration in fishes	BT2	CO1	PO2
2	Explain the process of digestion in Scoliodon	BT1	CO1	PO2
3	Discuss the general characters of fishes and add a note on the salient features of dipnoi			

SHORT QUESTIONS

S.No.	QUESTION	BT LEVEL	CO	PO
1	Placoid scale	BT1	CO1	PO2
2	Lateral line	BT2	CO1	PO2
3	Elasmobranch	BT1	CO1	PO2

UNIT-III
ESSAY QUESTIONS

S.No.	QUESTION	BT- LEVEL	CO	PO
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2	Explain the external features of <i>Calotes</i>	BT2	CO1	PO2
3	Describe the general characters of Amphibia	BT1	CO1	PO2
4	Describe the Structure and function of heart in Rana	BT1	CO1	PO2
5	Give a detailed description on the process of identification of poisonous snakes	BT1	CO1	PO2

SHORT QUESTIONS

S.No.	QUESTION	BT LEVEL	CO	PO
1	<i>Apoda</i>	BT1	CO1	PO2
2	Crocodylia	BT2	CO1	PO2
3	Hybernation	BT2	CO1	PO2

UNIT-IV ESSAY QUESTIONS

S.No	QUESTION	BT LEVEL	CO	PO
1	Describe the flight adaptations in birds	BT1	CO1	PO2
2	Explain the respiratory system of <i>Columba livia</i>	BT2	CO1	PO2
3	Describe the general characters of Aves	BT1	CO1	PO2

SHORT QUESTIONS

S.No.	QUESTION	BT LEVEL	CO	PO
1	Quill feather	BT1	CO1	PO2
2	Archaeopteryx	BT2	CO1	PO2
3	Claws	BT1	CO1	PO2
4	Adaptation	BT2	CO1	PO2

UNIT-V
ESSAY QUESTIONS

S.No.	QUESTION	BT LEVEL	CO	PO
1	Write an essay on dentition in mammals	BT2	CO1	PO2
2	Describe the Aquatic adaptation in mammals	BT1	CO2	PO1
3	Explain the general characters of mammals	BT2	CO1	PO2

SHORT QUESTIONS

S.No.	QUESTION	BT LEVEL	CO	PO
1	Prototheria	BT1	CO1	PO2
2	Canines	BT2	CO1	PO2
3	Mammary glands	BT1	CO1	PO2

COURSE 2: ANIMAL DIVERISTY-II BIOLOGY OF CHORDATES

BLUE PRINT

Time: 2 1/2 hrs

Max. Marks: 50

Unit	Essay	Short
I	1	1
II	1	1
III	1	2
IV	1	1
V	2	2
Total	Out of 6, 3 questions should be answered 3X10=30M	Out of 7, 4questions should be answered 4X5=20M

Pithapur Rajah's Govt. College (A) Kakinada.

MODEL QUESTION PAPER

I SEMESTER - ZOOLOGY - PAPER - II

COURSE I: ANIMAL DIVERSITY-II BIOLOGY OF CHORDATES

Time: 2 hrs

Max. Marks: 50

SECTION - A

- I. Answer any THREE of the following. Choosing at least one from each part. Draw labeled diagrams wherever necessary

3x10=30 M

PART- I

19. Explain the life history of Herdmania
20. Explain the process of migration in fishes
21. Explain the process of digestion in Scoliodon

PART- II

22. Describe the flight adaptations in birds
23. Describe the Aquatic adaptation in mammals
24. Write an essay on dentition in mammals

SECTION - B

II. Answer any FOUR of the following:

Draw labeled diagrams wherever necessary

4x5=20 M

7. Cyclostomata
8. Plooid Scales
9. Hybernation
10. Apoda
11. Archaeopteryx
12. Mammary glands
13. Canines

	Pithapur Rajah's Govt. Degree College (A) Kakinada.	Program & Semester B.Sc. Honours in Zoology (Major) Semester-II			
Course Code	COURSE II: ANIMAL DIVERSITY-II BIOLOGY OF CHORDATES - PRACTICALS				
Teaching	Hours Allocated: 30 (Lab)	L	T	P	C
Pre-requisites:		0	0	3	2

Course 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, labeled record of identified museum specimens

SYLLABUS

25. Protochordata: *Herdmania*, *Amphioxus*, *Amphioxus* T.S through pharynx.
26. Cyclostomes: *Petromyzon* and *Myxine*.
27. Pisces: *Pristis*, *Torpedo*, *Hippocampus*, *Exocoetus*, *Echeneis*, *Labeo*, *Catla*, *Clarius*, *Channa*, *Anguilla*.
28. Amphibia: *Ichthyophis*, *Amblystoma*, *Axolotl* larva, *Hyla*,
29. Reptilia: *Draco*, *Chamaeleon*, *Uromastix*, *Testudo*, *Trionyx*, *Russels viper*, *Naja*, *Krait*, *Hydrophis*, *Crocodile*.
30. Aves: *Psittacula*, *Eudynamis*, *Bubo*, *Alcedo*.
31. Mammalia: *Ornithorhynchus*, *Pteropus*, *Funambulus*.
32. **Dissections**-As per UGC guidelines
 - Scoliodon* IX and X, Cranial nerves
 - Scoliodon* Brain
 - 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.

REFERENCE WEB LINKS:

- <https://nt7-mhe-complex-assets.mheducation.com/nt7-mhe-complex-assets/Upload->

20190715/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.p
df](http://www.zoologyresources.com/uploadfiles/books/dc64b77d8769325515d17c945e461b45.pdf)

	Pithapur Rajah's Govt. Degree College (A) Kakinada.	Program & Semester B.Sc. Honours in Zoology (Major) Semester-I
Course Code	TITLE OF THE COURSE COURSE II: ANIMAL DIVERSITY-I BIOLOGY OF CHORDATES Model question paper	
Max marks :50		Time 3hrs

I. Identify the following specimens or spotters & slides, draw neat labeled diagrams– write notes on

-----6x5=30M

- A. Herdmania
- B. Amphioxus T.S. through pharynx
- C. Exocoetus
- D. Hyla
- E. Draco
- F. Bubo

II. .Dissect and draw the labeled diagram of Scoliodon IX and X, Cranial nerves

1x10=10M

5M

III. Viva –Voce

5M

IV. Record

50M

PR Government College (A), Kakinada

SEMESTER-II

COURSE 3: CELL & MOLECULAR BIOLOGY

Theory

Credits: 3

3 hrs/week

COURSE OBJECTIVES:

- To understand the cell and distinguish between prokaryotic and eukaryotic cell □
- To understand the role of different cell organelles in maintenance of life activities □
- To acquaint the students with the concepts of cell division and cell cycle □
- 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 acquaint the students on the biological importance of biomolecules. □

LEARNING 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 and molecular biology by the completion of the course student will able 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. □
- Explain the cell cycle and bioenergetics of the cell □
- Understand the central dogma of molecular biology and flow of genetic information from DNA □
to proteins
- Understand the gene expression phenomenon and biological importance of biomolecules □

SYLLABUS:

UNIT- I Cell Biology-I

- 1.1 Definition, history, prokaryotic and eukaryotic cells, virus, viroids, mycoplasma
- 1.2 Electron microscopic structure of animal cell.
- 1.3 Plasma membrane –Models and Fluid mosaic model
- 1.4 Transport functions of plasma membrane-Active – passive- facilitated.

Activity: Model preparation of cell/Assignment /Students Seminar /Quiz/Project/Peer teaching on the above

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT -II Cell Biology-II

- 2.1 Structure and functions of Golgi complex & Endoplasmic Reticulum
- 2.2 Structure and functions of Lysosomes & Ribosomes
- 2.3 Structure and functions of Mitochondria & Centriole
- 2.4 Structure and functions of Nucleus & Chromosomes

Activity: Model preparation of cell organelles/Assignment /Students Seminar /Quiz/Project/Peer teaching on the above

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT – III: Cell Biology-III

- 3.1 Cell Division- mitosis, meiosis
- 3.2 Cell cycle – stages- check points- regulation
- 3.3 Abnormal cell growth- cancer- apoptosis
- 3.4 Bio energetics- Glycolysis-Krebs cycle-ETS

Activity: Model preparation cell division /Assignment /Students Seminar /Quiz/Project/Peer teaching/Report writing after watching any video on the above

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT -IV: Molecular Biology-I

- 4.1 Central Dogma of Molecular Biology
- 4.2 Basic concepts of - DNA replication – Overview (Semi-conservative mechanism, Semi-discontinuous mode, Origin & Propagation of replication fork)
- 4.3 Transcription in prokaryotes – Initiation, Elongation and Termination, Post- transcriptional modifications (basics)
- 4.4 Translation – Initiation, Elongation and Termination

Activity: Model preparation of DNA/Assignment /Students Seminar /Quiz/Project/Peer teaching/Report writing after watching any video on the above

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT -V: Molecular Biology-II

- 5.1 Gene Expression in prokaryotes (Lac Operon); Gene Expression in eukaryotes
- 5.2 Biomolecules- Carbohydrates (Glucose- structure-properties- biological importance only)
- 5.3 Biomolecules- Protein (Amino acid- structure- properties- biological importance only)
- 5.4 Biomolecules- Lipids (Fatty acid- structure - properties- biological importance only) *Activity: Assignment / Students Seminar / Quiz/Project/Peer teaching/Report writing after watching any video on the above*

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

CO-CURRICULAR ACTIVITIES:

- 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 □
- Charts on central dogma/lac operon/genetic code □
- Model of semi-conservative model of DNA replication □
- Power point presentation of any of the above topics by students □

REFERENCE BOOKS:

- Lodish, Berk, Zipursky, Matsudaria, Baltimore, Darnell, Molecular Cell Biology. Freeman and company New York. * Cell Biology by De Robertis □
- Bruce Alberts, Molecular Biology of the Cell * Rastogi, Cytology *Varma & Aggarwal, Cell Biology *C.B. Pawar, Cell Biology * Molecular Biology by Frei fielder □
- Instant Notes in Molecular Biology by Bios scientific publishers and Viva Books Private Limited * James D. Watson, Nancy H. Hopkins „Molecular Biology of the Gene" □

CO-PO Mapping

1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], 0 : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	1	2	2	1	2	1	3	2	3	2	1	2	2
CO2	2	1	3	2	1	1	2	3	1	1	2	2	2
CO3	1	1	2	3	3	1	1	1	2	3	1	2	1
CO4	2	2	3	2	2	2	1	2	1	2	2	1	2
CO5	1	2	1	1	1	2	2	1	1	1	1	1	2

Pithapur Rajah's Govt. Degree College (A) Kakinada.

DEPARTMENT OF ZOOLOGY

MODEL PAPER FOR II SEMESTER
COURSE 3: CELL & MOLECULAR BIOLOGY

Time: 2 hrs

Max. Marks: 50

SECTION - A

Answer any THREE of the following. Choosing at least one from each

part. Draw labeled diagrams wherever necessary

3x10=30

PART- I

1. Explain the Fluid Mosaic Model of the plasma membrane and discuss its transport functions.
2. Write an essay on the structure and functions of mitochondria
3. . Explain the stages of meiosis with neat labelled diagrams.

PART- II

4. Discuss the steps of DNA replication
5. Explain the Lac Operon model of gene regulation in prokaryotes
6. Explain Structure and Properties of Fatty Acids

SECTION - B

Answer any FOUR of the following:

Draw labeled diagrams wherever necessary

4x5=20

7. Virus
8. Ribosomes
9. Meiosis
10. Glycolysis
11. Initiation
12. Gene Expression
13. Amino acid- structure

BLUE PRINT

Time: 2 hrs

Max. Marks: 50

Unit	Essay questions	Short answer questions
I	1	1
II	1	1
III	1	2
IV	1	1
V	2 Out of 6, 3 questions should be answered 3X10=30M	2 Out of 7, 4 questions should be answered 4X5=20M

QUESTION BANK

Essay Questions

UNIT – I: Cell Biology – I

1. Describe the structure and differences between prokaryotic and eukaryotic cells.
2. Explain the Fluid Mosaic Model of the plasma membrane and discuss its transport functions.

UNIT – II: Cell Biology – II

3. Describe the structure and functions of the Golgi complex.
4. Describe the structure and functions of Endoplasmic Reticulum
5. Write an essay on the structure and functions of mitochondria

UNIT – III: Cell Biology – III

6. Explain the stages of meiosis with neat labelled diagrams.
7. Write an essay on the cell cycle and its regulation.
8. Describe the process of glycolysis and its significance.
9. Explain Krebs cycle in respiration.

UNIT – IV: Molecular Biology – I 10.

Discuss the steps of DNA replication.

11. Describe the process of transcription and translation in prokaryotes

UNIT – V: Molecular Biology – II

12. Explain the Lac Operon model of gene regulation in prokaryotes

13. Explain Structure and Properties of Fatty Acids

SHORT ANSWER QUESTIONS

UNIT I – Cell Biology I

1. Differences between prokaryotic and eukaryotic cells
2. Structure and significance of virus, viroids, and mycoplasma
3. Structure and functions of the plasma membrane
4. Active and passive transport across the plasma membrane

UNIT II – Cell Biology II

5. Structure and functions of the Golgi complex
6. Functions of Endoplasmic Reticulum
7. Structure and role of lysosomes
8. Structure and functions of ribosomes

UNIT III – Cell Biology III

9. Stages of mitosis
10. Differences between mitosis and meiosis
11. Role of checkpoints in the cell cycle
12. Apoptosis and its biological significance

UNIT IV – Molecular Biology I

13. Semi-conservative mechanism of DNA replication
14. Steps involved in transcription in prokaryotes

UNIT V – Molecular Biology II

15. Lac Operon model of gene regulation
16. Carbohydrates

	Pithapur Rajah's Govt. Degree College (A) Kakinada.	Program & Semester B.Sc. Honours in Zoology (Major) Semester-II			
Course Code	TITLE OF THE COURSE COURSE 3: CELL & MOLECULAR BIOLOGY				
Teaching	Hours Allocated: 30 (Lab)	L	T	P	C
Pre-requisites:		0	0	3	2

❑ Objectives:

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

SYLLABUS:

1. Preparation of temporary slides of Mitotic divisions with onion root tips
2. Observation of various stages of Mitosis with prepared slides
3. Observation of various stages of Meiosis with prepared slides
4. Mounting of salivary gland chromosomes of Chironomus
5. Test for carbohydrate in given biological sample (Benedict's test)
6. Test for Protein in given biological sample (Nitric acid test -white ring)
7. Test for lipid in the given biological sample (Saponification test)

REFERENCE WEB LINKS:

- <https://cbi-au.vlabs.ac.in/>
- <https://www.youtube.com/watch?v=xhnUZAYNdQk>
- https://www.youtube.com/watch?v=l8LXQq5_VL0
- <https://www.labster.com/simulations>
- <https://www.sciencecourseware.org/BiologyLabsOnline/protected/TranslationLab/index.php>
- <https://virtual-labs.github.io/exp-analysis-of-carbohydrates-au/procedure.html>
- https://www.labxchange.org/library/items/lb:LabXchange:f10fd7ad:lx_simulation:1
- <http://www.zoologyresources.com/uploadfiles/books/dc64b77d8769325515d17c945e461b45.pdf>

	Pithapur Rajah's Govt. Degree College (A) Kakinada.	Program & Semester B.Sc. Honours in Zoology (Major) Semester-II
Course Code	TITLE OF THE COURSE COURSE 3: CELL & MOLECULAR BIOLOGY Model question paper	
Max marks :50		Time 3hrs

I. Identify the given spotter/slides and write identification points with neat labeled diagrams 5X4=20 marks

- A. Metaphase of Mitosis
- B. Telophase of Mitosis
- C. Zygotene
- D. Diplotene
- E. Polytene chromosomes

II. Major experiment _____ 15M. III. Minor experiment _5M.

IV. Viva -Voce- 5M

V. Record..... 5M

Total

50

PR Government College (A), Kakinada

SEMESTER-II

COURSE 4: EMBRYOLOGY

Theory

Credits: 3

3 hrs/week

COURSE OBJECTIVES:

- The objective of this course is to provide a comprehensive understanding of the concepts of early animal development. □
- Students taking this course must develop a critical appreciation of methodologies specifically used to study the process of embryonic development in animals. □
- In this course different concepts of animal development will be elaborated □
- Students will be made familiar with different approaches that have been used to study embryology. □
- Topics that will be discussed are organogenesis and regeneration. □

LEARNING OUTCOMES:

The overall course outcome is that the student shall develop deeper understanding of concepts of embryology. This course will provide students with a deep knowledge in embryology, by completion of the course student will be able to –

- Understand the historical perspective and concepts of embryology □
- Acquire knowledge on gametogenesis, fertilization and cleavage patterns □
- Understand the fate of germinal layers and extraembryonic membranes □
- Explain the process of regeneration in certain animals □
- Examine the process of organogenesis □

SYLLABUS:

UNIT-I:

- 1.1 Historical perspective and basic concepts: Phases of development
- 1.2 Cell-Cell interaction, Pattern formation, Differentiation and growth
- 1.3 Differential gene expression,
- 1.4 Cytoplasmic determinants and asymmetric cell division

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT-II:

- 2.1 Gametogenesis, Spermatogenesis, Oogenesis;
- 2.2 Types of eggs, Egg membranes; Fertilization (External and Internal)

2.3 Planes and patterns of cleavage; Types of Blastulae; Fate maps

2.4 Early development of frog and chick up to gastrulation

Activity: *Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/Model preparation on cleavage planes*

Evaluation: *Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity*

UNIT-III:

3.1 Fate of Germ Layers

3.2 Extra-embryonic membranes

3.3 Placenta (Structure, types and functions of placenta)

3.4 Amniocentesis

Activity: *Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/Chart preparation on the placenta*

Evaluation: *Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity*

UNIT-IV:

4.1 Metamorphosis: Changes, hormonal regulations in amphibians

4.2 Regeneration: Modes of regeneration, epimorphosis, morphallaxis and compensatory regeneration (in Turbellarians)

4.3 Ageing: Concepts and Theories

4.4 Teratogenic agents and their effects on embryonic development

Activity: *Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above /Flow chart preparation on the process of metamorphosis highlighting the periodical changes vs hormone activity*

Evaluation: *Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity*

UNIT-V:

5.1 Comparative study of Gastrulation in Frog, Chick and Mammal

5.2 Induction and embryonic organizers (Spemann's experiment)

5.3 Organogenesis of Skin

5.4 Organogenesis of Circulatory system

(* Organogenesis in Human need to be explained)

Activity: *Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above /Flow chart preparation on the process of organogenesis highlighting the gradual developments of organ systems*

Evaluation: *Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity*

CO-CURRICULAR ACTIVITIES:

- Preparation of models of different types of eggs in animals□
- Chart on frog embryonic development, fate map of frog blastula, cleavage etc.□
- Chart on the organogenesis□
- RBPT on the Placenta□

- Model of extra embryonic membrane□
- Laboratory observation of chick embryonic development□

REFERENCES BOOKS:

- Developmental Biology by Balinsky □
- Developmental Biology by Gerard Karp □
- Chordate embryology by Varma and Agarwal□
- Embryology by V.B. Rastogi
- Austen CR and Short RV. 1980. *Reproduction in Mammals*. Cambridge University Press.
- Gilbert SF. 2006. *Developmental Biology*, 8th Edition. Sinauer Associates Inc., Publishers, Sunderland, USA.□
- Longo FJ. 1987. *Fertilization*. Chapman & Hall, London.□
- Rastogi VB and Jayaraj MS. 1989. *Developmental Biology*. Kedar Anath Ram Nath Publishers, Meerut, Uttar Pradesh.□
- Schatten H and Schatten G. 1989. *Molecular Biology of Fertilization*. Academic Press, New York.□

CO-PO MAPPING

1: Slight [Low];2: Moderate [Medium];3: Substantial [High], 0No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	1	2	2	1	2	2	3	2	3	2	2	2	2
CO2	2	1	2	2	1	1	2	3	1	2	2	2	2
CO3	1	1	2	3	2	1	1	2	2	2	1	2	1
CO4	2	2	3	2	2	2	2	2	2	2	2	2	2
CO5	2	2	1	1	1	2	2	1	1	1	1	1	2

BLUE PRINT

MODULE NO.	ESSAY QUESTIONS 10 MARKS	SHORT ANSWER QUESTIONS 5 MARKS	MARKS ALLOTTED TO THE UNIT
Module -I	01	02	20
Module -II	02	01	25
Module -III	01	01	15
Module -IV	01	01	15
Module -V	01	02	20

TOTAL	06 Of which 3 to be answered	07 Of which 4 to be answered	95 marks including choice Of which 50 marks to be answered
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PITHAPUR RAJA'S GOVT. COLLEGE (A), KAKINADA

Semester-II

COURSE IV- EMBRYOLOGY

MODEL QUESTION PAPER

Time: 2 hrs.

Max Marks: 50

SECTION –A

Answer Any THREE of the following by choosing at least one question in each part.

Draw labeled diagrams wherever necessary

3X10=30 M

Part I

	Question	co	po
1	Describe the Phases of development of Embryology	1	2
2	Give an account of Spermatogenesis	2	3
3	Explain Planes and Patterns of cleavage.	1	2

Part II

	Question	co	po
4	Write an essay on different types of placenta.	1	3
5	Describe metamorphosis in amphibians	1	
6	Explain organogenesis of Eye	2	2

Section B

Answer Any Five of the following questions

4x5=20 Marks

S.No	Short Question	Co	po
6	Cytoplasmic determinants	2	1
7	Phases of embryonic development	2	1
8	Extra-embryonic membranes	1	2
9	Amniocentesis	2	1
10	Teratogenic agents	2	2
11	Gastrulation in Frog	3	1
12	Ear development	1	2

**PITHAPUR RAJAH'S GOVT. COLLEGE (AUTONOMOUS),
KAKINADA**

**DEPARTMENT OF ZOOLOGY AND AQUACULTURE
QUESTION BANK**

Embryology – Paper IV

QUESTION BANK

UNIT-I: Historical Perspective, Basic Concepts, and Early Developmental Processes

Essay Questions

1. Describe the historical development of embryology
2. Describe the Cell-Cell interaction
3. Explain differential gene expression

Short Questions

1. Define Cytoplasmic determinants
2. What is asymmetric cell division
3. Phases of embryonic development
4. Pattern formation

UNIT-II: Gametogenesis, Fertilization, Cleavage, and Gastrulation Essay

Questions

1. Give an account of gametogenesis.
2. Explain Planes and patterns of cleavage.
3. Describe fertilization process, compared to external and internal modes

Short Questions

1. Extra-embryonic membranes?
2. Define planes of cleavage.
3. List types of eggs.
4. Draw a fate map of frog embryo.

UNIT-III: Germ Layers, Extra-embryonic Membranes, Placenta, and Diagnostic Techniques

Essay Questions

1. Discuss fate of germ layers with suitable examples and diagrams.
2. Explain structure, types, and functions of placenta. (
3. Illustrate the Extra-Embryonic Membranes and their functions

Short Questions

- 7 Derivatives of ectoderm.
- 8 Define placenta, and mention the functions .
- 9 Amniocentesis.

UNIT-IV: Metamorphosis, Regeneration, Ageing, and Teratogenesis Essay

Questions

1. Describe metamorphosis in amphibians,
2. Explain the Modes of Regeneration
3. Discuss theories of ageing and effects of teratogenic agents on development.

Short Questions

1. Name hormones in amphibian metamorphosis.
2. Define epimorphosis.

3. What is morphallaxis? Give an example.
4. Teratogenic agents.

UNIT-V: Organogenesis of Key Systems Essay

Questions

- 10 Describe organogenesis of central nervous system with diagrams.
- 11 Explain organogenesis of Eye
- 12 Give an account of skin and circulatory system organogenesis.

Short Questions

1. Gastrulation in Frog
2. Ear development
3. Heart organogenesis.
4. Name layers of skin in development.

SEMESTER-II COURSE 4:

EMBRYOLOGY

Practical

Credits: 1

2 hrs/week

COURSE OBJECTIVES:

- The objective of this course is to provide a comprehensive practical knowledge on the embryology
- Must develop a critical understanding of the early embryological events
- Acquire knowledge on the developmental stages of chick
- Understand the histology of placenta

SYLLABUS:

1. Study of whole mounts and sections of developmental stages of frog through permanent slides: Cleavage stages, blastula, gastrula, neurula, tail-bud stage, tadpole (external and internal gill stages)
2. Study of whole mounts of developmental stages of chick through permanent slides: Primitive streak (13 and 18 hours), 21, 24, 28, 33, 36, 48, 72, and 96 hours of incubation (Hamilton and Hamburger stages)
3. Study of different sections of placenta (photomicrograph/ slides)
4. Project report on chick embryo development

REFERENCE WEB LINKS:

- <https://praxilabs.com/en/3d-simulations/cultivation-and-preparation-of-the-virus-in-chick-embryo-virtual-lab>
- <https://vlab.amrita.edu/>
- <https://www.vlab.co.in/>
- https://www.youtube.com/watch?v=p_tx88He8Pk
- <https://core.ac.uk/download/143957972.pdf>
- <https://egyankosh.ac.in/bitstream/123456789/57549/1/Exercise%20%20Chick%20Embryo.pdf>
- http://www.macollege.in/app/webroot/uploads/department_materials/doc_501.pdf
- http://www.zoologyresources.com/uploadfiles/books/dc64b77d8769325515d17c945e461b4_5.pdf

PRACTICAL MODEL PAPER

EMBRYOLOGY

1. Project report on chick embryo development.	12M
2. Study of different sections of placenta	8 M
3. Identify the following	5X4=20M
A) Embryology slide	
B) Embryology slide	
C) Embryology slide	
D) Embryology slide	
E) Embryology slide	
4. Record	05 M
5. Viva	05 M
Total	50

SEMESTER II
Multidisciplinary Course
Principles of Biological Sciences

Hours Allocated: 30 (THEORY)

Cr:3

Syllabus

Learning Outcomes: On completion of this course students will be able to:

1. Understand the relationship between structure and function at all levels.
2. Recognize the mechanisms underlying biological evolution, its patterns, and its significance as biology's overarching unifying principle.
3. Understand the contributions of biology to the resolution of medical, ethical, social, and environmental concerns in human affairs.

NIT-I Diversity of Life

1.1 Introduction to Biology, Branches of Biology, Basic Principles of Biology

1.2 Biological Classification-Two kingdom and Five kingdom classification,

Viruses, roid'sand Lichens

1.3 Diversity in the living world, Taxonomic categories, Taxonomic aids

1.4 Plant organization-The form, structure and function of plant vegetative and reproductive organs, Classification of Plant Kingdom,

1.5 Basis of Animal Classification, Classification of Animal Kingdom

NIT-II Biomolecules and metabolism

2.1 Ultra structure of cell and Cell organelles (Structure and Functions), Plant cell vs Animal cell

2.2 Plant Physiology: Photosynthesis, Respiration, Transportation, Mechanisms of Nitrogen fixation.

2.3 Plant growth and development, physiology of flowering.

2.4 Human Physiology: Digestion, Respiration, Circulation

2.5 Male and female reproductive organs, gametogenesis, fertilization

UNIT-III Principles of Biology

3.1 Genetics: Mendel's laws of inheritance, Genetic disorders- Colour blindness, Sickle cellanaemia.

3.2 Evolution: Geological time scale for evolution of plants and vertebrates, Origin andevolution of plants and man

3.3 Common Human Diseases: causing organism, prevention and treatment- malaria, dengue, AIDS, cancer, corona.

3.4 Common Plant Diseases: causing organism, prevention and treatment- Black spot, Leafspots, Powdery mildew, Blight, Canker.

3.5 Biotechnology: Tools and process of recombinant DNA technology, Applications of biotechnology in agriculture, food industry, medicine and transgenic animals.

Text Books

1. Pandey, B.P. (2013) College Botany, Volume-I, S. Chand Publishing, New Delhi.
2. Kotpal, R.L. 2022. Modern textbook of zoology, Vertebrates. (Rastogi Publ., Meerut).
3. Verma P.S., Agarwal V.K., 2006. Cell biology, genetics, Molecular Biology, Evolution and Ecology. S. Chand publishers, New Delhi, India.

Reference Books

1. Sreekrishna V. 2005. Biotechnology –I, Cell Biology and Genetics. New Age International Publ. New Delhi, India.
2. Rastogi, S.C., 2019. Essentials of animal physiology. 4th Edition. New Age International Publishers.

BLUE PRINT

MODULE	ESSAY QUESTIONS 10 MARKS	SHORT ANSWER QUESTIONS 5 MARKS	MARKS ALLOTTED TO THE UNIT
MODULE – I	01	02	20
MODULE – II	02	02	30
MODULE – III	02	03	35
Total no.of Questions	05 Of which 3 to be answered	07 Of which 4 to be answered	85 marks including choice Of which 50 marks to be answered

PITAPUR RAJAH'S GOVERNMENT COLLEGE (A), KAKINADA
MULTI DISCIPLINARY COURSE - SEM II
PRINCIPLES OF BIOLOGICAL SCIENCES
MODEL QUESTION PAPER
SECTION- A

Time:2hrs.

Max.Marks:50

Answer any THREE of the following questions

3X10=30

1. Write an overview on five kingdom classification?
2. Discuss the ultrastructure of a cell and the functions of cell organelles. Compare the structure of plant cells and animal cells?
3. Explain the physiology of photosynthesis, respiration, and transportation in plants.
4. Discuss Mendel's laws of inheritance and their significance in understanding genetic traits.
5. Examine common plant diseases. Describe the causal preventive measures, and treatment methods.

SECTION- B

Answer any FOUR of the following questions

4X5=20

6. Viroid
7. Plant Reproductive organs
8. Plant cell structure
9. Fertilization
10. Geological time scale
11. Applications of Biotechnology
12. Photosynt

SEMESTER III

PITHAPUR RAJAH'S GOVT. COLLEGE(A) KAKINADA.

DEPARTMENT OF ZOOLOGY

SEMESTER-III

COURSE 5: GENETICS

Theory Credits:3

3hrs/week

LEARNING OBJECTIVES □ .

- 1.To provide the required knowledge on the genetic interactions
- 2.To distinguish between polygenic, sex-linked, and multiple allelic modes of inheritance and extrachromosomal inheritance.
- 3.To understand the principles of sex determination in animals with a reference to human beings, and sex- linked inheritance
- 4.To understand the human karyotyping and the concept of pedigree analysis basics.

LEARNING OUTCOMES:

- 1.To understand the history of genetics, gain knowledge basic terminology of genetics
- 2.To acquire knowledge on interaction of genes, various types of inheritance patterns existing in animals with reference to non-Mendelian inheritance.
- 3.To acquire knowledge on chromosomal inheritance
- 4.Acquiring in-depth knowledge on various of aspects of genetics involved in sex determination,
- 5.Acquiring in-depth knowledge on human karyotyping, pedigree analysis and chromosomal disorders concepts of proteomics and genomics

SYLLABUS

UNIT-I:

1.1 History of Genetics- Concepts of Phenotype, Genotype, Heredity, Variation, Pure lines and Inbreed Lines

1.2 Mendelian Principles on Monohybrid cross, back cross and Test cross

1.3 Mendelian Principles on Dihybrid cross

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/Problem solving on Mendelian principles

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT-II:

2.1 Linkage - Definition, Types of linkage-complete linkage and incomplete linkage, Significance of linkage.

2.2 Crossing over - definition; Mechanism of crossing over: Chiasma Interference and coincidence

2.4 Gene Interactions: Incomplete dominance, codominance, Pleiotropy

2.5 Gene Interactions: Lethal alleles, Epistasis, Non- Epistasis

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/Model preparation of linkage/crossing over

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT-III:

3.1 Polygenes (General Characteristics & examples)

3.2 Multiple Alleles (General Characteristics and Blood group inheritance)

3.3 Rh inheritance erythroblastosis foetalis

3.4 Extra chromosomal inheritance- Kappa particles in Paramecium and Shell coiling in snails

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after

watching any video on the above/Case study on Rh/Erythroblastosis foetalis

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT-IV:

4.1 Sex determination- Chromosomal theory and Genic Balance theory

4.2 Sex determination- Hormonal, Environmental and Haplo-diploidy types

4.3 Sex linked inheritance: X-linked inheritance

4.4 Sex linked inheritance: Y-linked & XY-linked inheritance

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/ Preparation of animated model /chart on sex determination methods

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT-V:

5.1 Human karyotyping, Pedigree Analysis(basics)

5.2 Autosomal Recessive disorder-Sickle cell anaemia – causes, treatment, inheritance pattern, modes of testing and prevention

5.3 Autosomal Dominant disorder- Huntington disease

5.4 Basics on Genomics and Proteomic

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/ Case study of a family for pedigree analysis

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

Co-curricular activities (Suggested)

- 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

- Karyotyping and preparation of pedigree charts for identifying diseases in family history
- Charts on chromosomal disorders

REFERENCE BOOKS:

- Harper, P. (2010). Practical genetic counselling. CRC Press.
- Kessler, S. (Ed.). (2013). Genetic counselling: psychological dimensions. Academic Press. 3.
- Stevenson, A. C., & Davison, B. C. (2016). Genetic counselling. Elsevier.
- Evans, C. (2006). Genetic counselling: a psychological approach. Cambridge University Press.
- References:
- Atlas of Inherited Metabolic Diseases.
- Mendelian Inheritance in Man: A Catalog of Human Genes and Genetic Disorders, Victor A. McKusick,.2 Vol I & II
- Stacy L Blachford (Editor) 2001. The Gale Encyclopedia of Genetic Disorders. Gale Group Publishers, Vol.1 (A-L), Vol.II (M-Z).
- Limoine, W.R. and Cooper, D.NB. 1996: Gene Trophy, Bios Scientific Pub.Oxford.
- REFERENCES:
- Gardner, E.J., Simmons, M.J., Snustad, D.P. (2008). Principles of Genetics. VIII Edition. Wiley India
- Snustad, D.P., Simmons, M.J. (2009). Principles of Genetics. V Edition. John Wiley and Sons Inc.
- Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics. X Edition. Benjamin Cummings.
- Russell, P. J. (2009). Genetics- A Molecular Approach. III Edition. Benjamin Cummings.
- Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B. Introduction to Genetic Analysis. IX Edition. W. H. Freeman and Co.

· James D. Watson, Nancy H. Hopkins ‘Molecular Biology of the Gene’

· Gupta P.K., ‘Genetics

CO-PO-PSO Mapping:

(1: Slight [Low];2: Moderate [Medium];3: Substantial [High], '-'NoCorrelation)

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	2	2	2	1	2	2	2	2
CO2	3	2	2	2	2	2	1	1	1	1
CO3	1	2	2	2	3	3	2	2	3	1
CO4	1	2	3	2	2	3	1	2	2	2
CO5	1	2	3	2	3	3	1	2	3	3

PITHAPUR RAJAH'S GOVT. COLLEGE(A) KAKINADA. DEPARTMENT OF ZOOLOGY

III SEMESTER ZOOLOGY

COURSE 5: GENETICS

BLUE PRINT

Time: 2 hrs

Max.Marks:50

Unit	Essay	Short	Marks allotted
			To the unit
I	1	1	15
II	2	2	30
III	1	2	20
IV	1	1	15
V	1	1	15
Total	6	7	95
	Out of 6,3questions should Be answered 3X10=30M	Outof7, 4questions Should be answered 4X5=20M	

MODEL QUESTION PAPER
III SEMESTER-ZOOLOGY-
COURSE 5: GENETICS

Time:2hrs

Max.Marks:50

SECTION-A

I. Answer any THREE of the following. Choosing at least one from each part.

Draw labelled diagrams wherever necessary

3x10=30

PART- I

- 1.Explain the Mendelian principle behind the Di hybrid cross? BT-1
- 2.What is crossing over? Explain the mechanism of crossing over in chromosomes?
- 3.What is epistasis? Explain epistasis with a suitable example? BT2

PART-II

- 4.What is extra chromosomal inheritance? Explain the inheritance of kappa particles in Paramecium? BT3
- 5.What is Haemophilia? Explain how it is inherited among the family members? BT1
- 6.Write an essay on the basics of Genomics and Proteomics? BT1

SECTION-B

II. Answer any FOUR of the following:

Draw labelled diagrams wherever necessary

4x5=20 M

7. Mono hybrid Cross BT1
8. Types of Linkage BT2
9. Incomplete Dominance BT1
10. Multiple Alleles BT3
11. Erythroblastosis fetalis BT2
12. Haplo-diploidy BT4
13. Sickle Cell Anaemia

QUESTIONBANK

UNIT-I

Essay question

- 1.explain about Mendal monohybrid cross BT1
- 2.Describe about Mendal dihybrid cross BT3
- 3.Explaine about pure lines and inbreed lines BT2

SHORT QUESTIONS

- 1.Variation BT1
- 2.test cross BT2
- 3.backcross BT3

UNIT-II

Essay questions

- 1.Write about linkage and explain types of linkages BT2
- 2.Describe about crossingoverBT2
- 3.explain about Epistasis BT3

SHORTQUESTIONS

- 1.Incomplete dominance, BT1
- 2.codominanceBT2
- 3.Pleiotropy BT3
4. Lethal allelesBT2

UNIT-III

Essay questions

- 1.Write about Extra chromosomal inheritance- Kappa particles in Paramecium BT2
2. Explain Rh inheritance Erythroblastosis foetalis BT3

SHORTQUESTIONS

1. Polygenes (General Characteristics) BT2
2. Multiple Alleles (General Characteristics) BT3

UNIT-IV:

Essay questions

- 1.Explain Sex linked inheritance: X-linked inheritance BT1

2. Explain Chromosomal theory and Genic Balance theory BT2

3. write Sex determination- Hormonal, Environmental BT2

SHORTQUESTIONS

1. Y-linked inheritance BT1
2. Haplo-diploidy types sex determination BT2

UNIT-V:

Essay questions

1. Write about Human karyotyping, BT3
2. Explain about Basics on Genomics and Proteomics BT3

SHORTQUESTIONS

1. Huntington disease BT1
2. Sickle cell anaemia BT2
3. Pedigree Analysis BT4

SEMESTER-III

COURSE6: PRINCIPLES OF GENETICS

Practical Credits:1

2hrs/week

LEARNING OBJECTIVES:

- 1.To acquire practical knowledge on the importance of Mendelian principles by solving the problems.
To provide the required knowledge on the gene interactions
- 2.To acquire 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 Ultra sonography (Virtual lab).
8. Scoring dysmorphic features in syndromic patients.
- 9.Genetic Counselling methods based on case history.
- 10.Construction and analysis of Pedigree.

REFERENCE 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.rlbcu.ac.in/pdf/Agriculture/AGP%20113%20%20Fundamentals%20of%20Genetics.p](https://www.rlbcu.ac.in/pdf/Agriculture/AGP%20113%20%20Fundamentals%20of%20Genetics.pdf)[dfhttps://coabnau.in/uploads/1610707528_GPB3.2PracticalManual-Final.pdf](https://coabnau.in/uploads/1610707528_GPB3.2PracticalManual-Final.pdf)

PITHAPUR RAJAH'S GOVT.DEGREE COLLEGE (A) KAKINADA.

DEPARTMENT OF ZOOLOGY

III SEMESTER-ZOOLOGY

COURSE 5: GENETICS

PRACTICAL MODEL QUESTION PAPER

Time:3Hrs

MaxMarks:50

I. Determination of human Blood Groups

10M

II. Problems on Mendelian inheritance

2X5=10M

III. Identification of syndromes

A. Patau Syndrome

4x5=20M

B. Klinefelter Syndrome

C. Turners Syndrome

D. Down Syndrome

Record-

5M

Viva-

5M

PITHAPUR RAJAH'S GOVT. COLLEGE (A) KAKINADA.
DEPARTMENT OF ZOOLOGY & AQUACULTURE
III SEMESTER

Course No.: 06 – EVOLUTION & ZOOGEOGRAPHY

3Hrs/Week

Credits :3

Course Objectives:

CO 1: To provide knowledge on origin of life, theories and forces of evolution

CO 2: To explore the evidences of evolution

CO 3: To Explain the theories of evolution

CO 4: To understand the role of variations and mutations in evolution of organisms

CO 5: To understand the zoogeographical distribution of animals

LEARNING OUTCOMES:

■ 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

■ Explain the different evidences of evolution

■ Understand the theories of evolution

■ Explain the various tools for evolution

■ Map the distribution of animals according to zoological realms

SYLLABUS

UNIT-I

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 evolution, present day atmosphere, evolution of eukaryotes.

1.4 Experimental evidences in support of Biochemical origin of life (Miller and Urey experiment)

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

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)

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

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

REFERENCES BOOKS:

■ Ridley, M. (2004). Evolution. III Edition. Blackwell Publishing

■ Hall, B. K. and Hallgrimsson, B. (2008). Evolution. IV Edition. Jones and Bartlett Publishers

■ Douglas, J. Futuyma (1997). Evolutionary Biology. Sinauer Associates.

■ Minkoff, E. (1983). Evolutionary Biology. Addison-Wesley.

■ Organic evolution by Organic evolution by Dr. Veer Bala Rastogi, 2019 Kedar Nath Ramnath

■ Palaeontology and Zoogeography Organic evolution by Dr. Veer Bala Rastogi, 2019 Kedarnath

■ Ramnath Rastogi VB. 1991. *Organic Evolution*. Kedar Nath Ram Nath Publications, Meerut, Uttar Pradesh, India.

■ Stahl FW. 1965. *Mechanics of Inheritance*. Prentice-Hall.

■ White MJD. 1973. Animal Cytology and Evolution. Cambridge Univ. Press

CO-PO Mapping:

(1:Slight[Low];2:Moderate[Medium];3:Substantial[High], -:No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	1	2	2	1	2	2	3	2	3	2	2	2	2
CO2	2	1	2	2	1	1	2	3	1	2	2	2	2
CO3	1	1	2	3	2	1	1	2	2	2	1	2	1
CO4	2	2	3	2	2	2	2	2	2	2	2	2	2
CO5	2	2	1	1	1	2	2	1	1	1	1	1	2

Pithapur Rajah's Govt. College (A) Kakinada.
DEPARTMENT OF ZOOLOGY & AQUACULTURE

III SEMESTER

Course No.: o6 – EVOLUTION & ZOOGEOGRAPHY

MODEL QUESTION PAPER

Time: 2 hrs

Max. Marks :50

SECTION- A

Note: Answer any THREE questions choosing at least one question from each section. Draw the diagrams wherever necessary **3 X10 = 30**

PART – I

1. What is evolution? Write an essay on the primordial atmosphere of earth and the origin of life in earth.-BT 1
2. Discuss the Palaeontological and taxonomical evidences in support of evolution BT 2
3. Write an essay on the Morphological and anatomical evidences in support of evolution BT 2

Part – II

4. Explain the modern synthetic theory of Evolution BT 3
5. What is Isolation? Explain the various isolation mechanisms leading to evolution of new species BT 3
6. Write in detail the fauna of Oriental and Australian Regions BT 1

SECTION-B

II. Answer any Four of the following.

4x5=20

7. Miller and Urey experiment BT 3
8. Connecting links and Missing Links BT 2
9. Germplasm Theory BT 2
10. Theory of Natural Selection BT 3
11. Mutations BT 2
12. Hardy-Weinberg principle BT 3
13. Barriers of Animal Distribution BT 2

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DEPARTMENT OF ZOOLOGY & AQUACULTURE

BLUE PRINT FOR QUESTION PAPER

III SEMESTER

Course No.: o6 – EVOLUTION & ZOOGEOGRAPHY

Time: 21/2 hrs

Max. Marks: 50

Unit	Essay	Short
I	1	1
II	2	1
III	1	2
IV	1	2
V	1	1
	Out of 6, 3 questions should be answered 3X10=30M	Out of 7, 4 questions should be answered 4X5=20M

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DEPARTMENT OF ZOOLOGY & AQUACULTURE

III SEMESTER

Course No.: 06 – EVOLUTION & ZOOGEOGRAPHY

QUESTION BANK

I. ESSAY TYPE QUESTIONS

1. What is evolution? Write an essay on the primordial atmosphere of earth and the origin of life in earth. BT 1
2. Describe the Miller and Urey experiment in support of Biochemical origin of life BT-3
3. Discuss the Palaeontological and taxonomical evidences in support of evolution BT 2
4. Write an essay on the Morphological and anatomical evidences in support of evolution BT 2
5. Write an essay on embryological and physiological evidences of evolution BT 2
6. Explain in detail Darwin's theory related to origin of species by natural selection BT 3
7. Explain the modern synthetic theory of Evolution BT 3
8. What are mutations? Explain the types of mutations, their causes and significance in evolution BT 2
9. What is Isolation? Explain the various isolation mechanisms leading to evolution of new species BT 3
10. Write in detail the fauna of Oriental and Australian Regions BT 1

II. SHORT ANSWER TYPE

1. Miller and Urey experiment BT 3
2. Coacervates BT 1
3. Primitive atmosphere BT2
4. Homologous Organs BT 1
5. Analogous Organs BT 1
6. Palaeontological evidences BT 2
7. Embryological Evidences BT 2
8. Theory of recapitulation BT2
9. Connecting links BT 2
10. Missing Links BT 2

11. Lamarckism BT 2
12. Germplasm Theory BT 2
13. Theory of Natural Selection BT 3
14. Variations BT 2
15. Sewal Wright Effect BT3
16. Mutations BT 2
17. Hardy-Weinberg principle BT3
18. Barriers of Animal Distribution BT2
19. Oriental Region BT1
20. Australian Region BT 1
21. Ethiopian Region BT 1

Pithapur Rajah's Govt. Degree College (A) Kakinada.
DEPARTMENT OF ZOOLOGY & AQUACULTURE

III SEMESTER

Course No.: o6 – EVOLUTION & ZOOGEOGRAPHY

2Hrs/Week

credits :1

PRACTICALS:

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

REFERENCE 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/>

Pithapur Rajah's Govt. College (A) Kakinada.

DEPARTMENT OF ZOOLOGY & AQUACULTURE

III SEMESTER

Course No.: 06 – EVOLUTION & ZOOGEOGRAPHY

Credits :1

PRACTICALS:

MODEL PAPER

Time: 2hrs

Max Marks: 50

1. Discuss Homology & Analogy with suitable examples-10M
2. Embryological evidences/Lamarkism/Darwinism with examples-10M
3. Connecting links/Missing links Identification with their salient features-10M
4. Genetic Drift with Darwin's Finches as examples

or

Mapping distribution of animals according to Zoogeographical regions-10M

4. Record	05M
5. Viva	05M
Total	50M

SEMESTER-III

COURSE 7: ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS

Theory

Credits: 3

3 hrs/week

COURSE OBJECTIVES:

- To acquire knowledge of organ systems function.
- To develop the ability to integrate physiology from the cellular and molecular level to the organ system and organismic level of organization.
- To effectively read, evaluate and communicate scientific information related to physiological processes in the body.
- To gain a deep knowledge of current topics in physiology.

LEARNING OUTCOMES:

The overall course outcome is that the student shall develop deeper understanding of concepts of Physiology. This course will provide students with a deep knowledge in physiology by the completion of the course student will able to –

- Understand the physiology of digestion and hormonal control of digestion
- Develop a comprehensive picture of respiratory physiology
- Acquire knowledge on the Renal physiology
- Understand the physiology of Nerve and muscle
- Understand the physiology of heart

SYLLABUS:

UNIT-I: Physiology of Digestion

- 1.1 Structural organization and functions of gastrointestinal tract and associated glands;
- 1.2 Vitamins & Mineral composition of food & Mechanical and chemical digestion of food;
- 1.3 Absorptions of carbohydrates, lipids, proteins, water, minerals and vitamins;
- 1.4 Hormonal control of secretion of enzymes in Gastrointestinal tract.

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above /Chart preparation on the hormonal control of secretion of enzymes
Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT-II: Physiology of Respiration

- 2.1 Structural organization of Respiratory system, Mechanism of respiration, Control of respiration
- 2.2 Pulmonary ventilation; Respiratory volumes and capacities;
- 2.3 Transport of oxygen in blood and dissociation curves and the factors influencing it
- 2.4 Transport of Carbon dioxide in blood; dissociation curves and the factors influencing it, Carbon monoxide poisoning

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above /Group discussion on the CO poisoning/Debate on the dissociation curves

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT-III: Renal Physiology

- 3.1 Structure of kidney and its functional UNIT
- 3.2 Mechanism of urine formation
- 3.3 Regulation of water balance
- 3.4 Regulation of acid-base balance

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above /Group discussion on the Urine formation/Working model of Kidney
Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT-IV: Physiology of exciting tissues

- 4.1 Neuron structure and types
- 4.2 Nerve impulse transmission-(Myelinated, Non-myelinated, synaptic)
- 4.3 Ultra structure of muscle
- 4.4 Molecular and chemical basis of muscle contraction

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above /Group discussion on the impulse trasnmission/Debate on the dissociation curves

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT- V: Physiology of Heart

- 5.1 Structure of mammalian heart, Coronary circulation;
- 5.2 Structure and working of conducting myocardial fibers. Origin and conduction of cardiac impulses
- 5.3 Cardiac Cycle-Cardiac output and its regulation
- 5.4 Nervous and chemical regulation of heart rate. Blood pressure and its regulation

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above /Group discussion on the phases of Cardiac output /case study on the Blood Pressure

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

CO-CURRICULAR ACTIVITIES:

- Chart on cardiac cycle, human lung, kidney/nephron structure etc.
- Working model of human / any mammalian heart.
- Working model of human / any mammalian urine formation
- Chart/model of sarcomere
- Chart/model on nerve impulse transmission

REFERENCES BOOKS:

- Eckert H. *Animal Physiology: Mechanisms and Adaptation*. W.H. Freeman & Company.
- Flory E. *An Introduction to General and Comparative Animal Physiology*. W.B. Saunders Co., Philadelphia.
- Goel KA and Satish KV. 1989. *A Text Book of Animal Physiology*, Rastogi Publications, Meerut, U.P.
- Hoar WS. *General and Comparative Physiology*. Prentice Hall of India, New Delhi.
- Lehninger AL. Nelson and Cox. *Principles of Biochemistry*. Lange Medical Publications, New Delhi.
- Prosser CL and Brown FA. *Comparative Animal Physiology*. W.B. Saunders Company, Philadelphia.

Additional Inputs:

1. Classification of animals based on Feeding habits 2. Excretory Products.
3. Structure and types of Neurons 4. Types of muscles 5. Blood Pressure

CO-PO Mapping:

The COs are mapped to POs based on the relevance on a scale of 0-3

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-'/0: No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	1	1	1	0	1	0	3	3
CO2	3	3	2	2	1	1	3	2	3	3
CO3	3	3	3	2	1	0	2	1	3	3
CO4	3	3	2	2	2	0	3	1	3	3
CO5	3	3	1	2	2	0	3	1	3	3
Average	3.0	2.8	1.8	1.8	1.4	0.2	2.4	1.0	3.0	3.0

P.R. GOVT. COLLEGE (AUTONOMOUS), KAKINADA
DEPARTMENT OF ZOOLOGY AND AQUACULTURE
SEMESTER-III COURSE: VII

ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS
BLUE PRINT

MODULE NO.	ESSAY QUESTIONS 10 MARKS	SHORT ANSWER QUESTIONS 5 MARKS	MARKS ALLOTTED TO THE UNIT
Module-I	01	02	20
Module-II	01	02	20
Module-III	02	01	25
Module-IV	01	01	15
Module-V	01	01	15
	06 Of which 3 to be answered	07 Of which 5 to be answered	95 marks including choice Of which 50 Marks to be answered

PR GOVERNMENT COLLEGE (A), KAKINADA

SEMESTER-III COURSE: VII

ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS

MODEL QUESTION PAPER

Time:2 hrs.

Max.Marks:50

SECTION-A

I. Answer any THREE questions choosing at least one question from each part.

Draw diagrams wherever necessary

3X10= 30 M

PART– 1

1. write an essay on the process of absorption of food materials. BT1
- 2.Elucidate the transport of Oxygen through lungs. BT2
3. Discuss about the urine formation Mechanism.BT3

Part– II

4. Describe the structure and factions of kidney. BT3
5. Discuss the Process of Muscle contraction. BT2
6. Write an essay on cardiac cycle. BT1

SECTION-B

Answer any Four of the following.

4x5=20 M

7. Chemical digestion of food.BT2
8. Gastro intestinal tract associated glands.BT3
9. Pulmonary ventilation BT2
10. Respiratory volumes and capacities. BT3
11. Regulation of acid-base balance. BT2
12. Structure of Neuron BT1
13. Blood pressure and its regulation.BT1

P.R. GOVT. COLLEGE (AUTONOMOUS), KAKINADA
SEMESTER-III
ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS
COURSE VII - QUESTION BANK

UNIT: I ESSAY QUESTIONS

1. Write an essay on Structural organization and functions of gastro intestinal tract and associated glands. BT1
2. Write an essay on the process of Absorptions. BT3
3. Discuss about Hormonal control of different Types of enzymes in Gastro intestinal tract. BT2
4. Elucidate the Mechanical and chemical digestion of food. BT2

Short Answer questions

5. Vitamins & Mineral composition of food.
6. Absorptions.
7. Gastro intestinal tract associated glands.
8. Mechanical digestion of food.

UNIT: II ESSAY QUESTIONS

1. Elucidate the transport of O₂ in blood; dissociation curves and the factors influencing it?
2. Elucidate the Transport of Carbon dioxide in blood and the factors influencing it. BT2
3. Write an essay on Mechanism of respiration and control of respiration .BT1

UNIT: III ESSAY QUESTIONS

1. Discuss about the mechanism of urine formation.
2. Describe the structural and functional unit of kidney.
3. Describe the structure and functions of Kidney.
4. Discuss about the Regulation of water and acid-base balance.

Shorts Answer questions:

1. Kidney structure
2. Counter current Mechanism.
3. Regulation of water balance
4. 4. Regulation of acid-base balance

UNIT: IV ESSAY QUESTIONS

1. Discuss about the Process of Muscle contraction.BT2
2. Write an essay on structure and types of Neuron.BT1
3. Describe the Ultrastructure of muscle.BT1

Shorts Answer questions:

1. Nerve impulse transmission.
2. Neuron structure.
3. Myelinated and non-myelinated sheath.
4. Neuro transmitters.

UNIT: V ESSAY QUESTIONS

1. Write an essay on cardiac cycle.BT2
2. Elucidate the Structure of mammalian heart.BT2
3. Describe the Structure and working of heart.BT2

Shorts Answer questions:

1. structure of heart.
2. Myogenic heart.
3. Neuro genic heart.
4. Blood pressure and its regulation.

SEMESTER-III

COURSE VII: ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS

PRACTICALS CREDITS:1 2HRS./WEEK

LEARNING OBJECTIVES

To acquire knowledge of anatomy of certain important organs.

To develop the ability to test the biological sample like saliva and urine.

To Effectively estimate the blood hemoglobin.

To Acquire skill to use the sphygmomanometer in recording blood pressure. To observe the ECG

SYLLABUS:

Examination of sections of mammalian esophagus, stomach, duodenum, ileum, rectum liver, trachea, lung, kidney

1. Study of activity of Salivary amylase under optimum condition
2. Qualitative tests for identification of Carbohydrates
3. Qualitative tests for identification of Proteins
4. Qualitative tests for identification of Fats
5. Urine test for sugar, albumin
6. Estimation of hemoglobin using Sahli's haemoglobinometer
7. Recording of blood pressure using a sphygmomanometer
8. Recording of frog's heart beat under insitu and perfused conditions
9. ECG observation-Spotting/identification of curves from the given ECG

REFERENCE WEB LINKS:

<https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham>

<https://library.csi.cuny.edu/oer/virtuallabs-simulations#anatomy>

<https://www.labster.com/simulations?course-packages=animal-physiology>

<http://www.zoologyresources.com/uploadfiles/books/dc64b77d8769325515d17c945e461b45.pdf>

[https://physiology.elte.hu/gyakorlat/jegyzet/Physiology_Pactical_\(2013\).pdf](https://physiology.elte.hu/gyakorlat/jegyzet/Physiology_Pactical_(2013).pdf)

PRACTICAL MODEL PAPER

ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS

I. Demonstrate and write procedures for the following Questions 12M

1. Estimation of the salivary Amylase Activity.

2. Identification of Proteins (Any Four). 8M

II. Identify the following write notes and draw diagram

5X4=20M

1. kidney

2. lung.

3.liver.

4.stomach

III.Record

05M

IV. Viva

05M

Total

50M

MULTIDISCIPLINARY COURSE

SEMESTER-III HEALTH AND HYGIENE

Credits:2

2 hrs/week

Unit I: Basics of Nutrition 10 Hrs.

1. Nutrition – definition, importance, good nutrition and mal nutrition; Balanced Diet: Basics of Meal Planning
2. Carbohydrates –functions, dietary sources, effects of deficiency.
3. Lipids –functions, dietary sources, effects of deficiency.
4. Proteins –functions, dietary sources, effects of deficiency.
5. Brief account of Vitamins- functions, food sources, effects of deficiency,
6. Macro and micro minerals –functions, effects of deficiency; food sources of Calcium, Potassium and Sodium; food sources of Iron, Iodine and Zinc
7. Importance of water– functions, sources, requirement and effects of deficiency.

Unit II: Health 10 Hrs.

8. Health - Determinants of health, Key Health Indicators, Environment health & Public health; Health-Education: Principles and Strategies

9. Health Policy & Health Organizations: Health Indicators and National Health Policy of Govt. of India-2017; Functioning of various nutrition and health organizations in India viz.,

NIN (National Institution of Nutrition), FNB (Food and Nutrition Board), ICMR

(Indian Council of Medical Research), IDA (Indian Dietetics

Association), WHO-India, UNICEF-India

10. National Health Mission: National Rural Health Mission (NRHM)

Framework, National Urban Health Mission (NUHM) Framework

11. Women & Child Health Care Schemes: Reproductive, Maternal, Newborn, Child and Adolescent Health (RMNCH+); Janani Shishu Suraksha Karyakaram (JSSK); Rashtriya Bal Swasthya Karyakram(RBSK); India Newborn Action Plan (INAP); Adolescent Health- Rashtriya Kishor Swasthya Karyakram (RKSK)

12. Disaster Management – Containment, Control and Prevention of Epidemics and Pandemics – Acts, Guidelines and Role of Government and Public

Unit III: Hygiene

10 Hrs.

13. Hygiene – Definition; Personal, Community, Medical and Culinary hygiene; WASH (Water, Sanitation and Hygiene) programme

14. Rural Community Health: Village health sanitation & Nutritional committee (Roles & Responsibilities); About Accredited Social Health Activist (ASHA); Village Health Nutrition Day, Roji Kalyan Samitis

15. Community & Personal Hygiene: Environmental Sanitation and Sanitation in Public places

16. Public Awareness through Digital Media - An Introduction to Mobile Apps of Government of India: NHP, Swasth Bharat, No More Tension, Pradhan Mantri Surakshit Mantriva Abhiyan (PM Suman Yojana), My Hospital (Mera aspathaal), India fights Dengue, JSK Helpline, Ayushman Bhava, Arogya Setu, Covid 19AP

REFERENCES

□ Bamji, M.S., K. Krishnaswamy & G.N.V. Brahmam (2009) Textbook of Human Nutrition(3rd edition) Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi

□ Swaminathan (1995)Food & Nutrition(Vol I, Second Edition) The Bangalore Printing &Publishing Co Ltd., , Bangalore

□ Vijaya Khader (2000)Food, nutrition & health, Kalyan Publishers, New Delhi

□ Srilakshmi, B., (2010)Food Science, (5th Edition) New Age International Ltd., New Del

SEMESTER III Health & Hygiene

Time: 2 Hours

Maximum Marks: 50

Section–A

I. Answer any THREE questions. Choosing at least 1 question from each part

3 × 10 = 30 Marks

PART I

1. Explain the functions, dietary sources and deficiency effects of **carbohydrates, lipids and proteins**.
2. Discuss the **National Health Mission** frameworks – NRHM and NUHM – and their key objectives.
3. Describe the types of **Hygiene** and elaborate on the **WASH programme**.

PART II

4. Give a detailed account of **vitamins** – their functions, sources and deficiency disorders.
5. Write an essay on the **Women and Child Health Care Schemes** in India.
6. Explain the **role of digital media** and important mobile apps of Government of India in creating public awareness of health and hygiene.

Section–B

II. Answer any Four questions.

4 × 5 = 20 Marks

7. Define **balanced diet**. What are the basics of meal planning?
8. Write the functions and deficiency effects of **iron, iodine and zinc**.
9. List the **key health indicators** and determinants of health.
10. Briefly describe the functioning of **NIN and ICMR**.
11. What are the **roles and responsibilities** of Village Health Sanitation & Nutritional Committee?
12. Write short notes on **environmental sanitation** and sanitation in public places.
13. Explain the role of an **Accredited Social Health Activist (ASHA)** in rural health.

SEMESTER IV

P.R Government College (A), Kakinada

SEMESTER IV

COURSE 8: IMMUNOLOGY

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

LEARNING OBJECTIVES

To promote critical thinking among students.

To provide students with a foundation in immunological processes

To provide students with knowledge on how the immune system works building on their previous knowledge

To clearly state the role of the immune system.

To compare and contrast the innate versus adaptive immune systems.

To provide an overview of the interaction between the immune system and pathogens.

LEARNING OUTCOMES:

The overall course outcome is that the student shall develop deeper understanding of concepts of immunology. This course will provide students with a deep knowledge in immunology by the completion of the course the graduate shall able to –

CO 1: Articulate the roles of innate recognition receptors in immune responses

CO 2: Compare and contrast humoral versus cell-mediated immune responses

CO 3: Distinguish various cell types involved in immune responses and associated functions;

CO 4: Distinguish and characterize antibody isotypes, development, and functions

CO 5: Understand the role of cytokines in immunity and immune cell activation;

CO 6: Understand the significance the Major Histocompatibility Complex in terms of immune response and transplantation

CO-PO Mapping:

The COs are mapped to POs based on the relevance on a scale of 0-3

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], -/0: No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	1	1	1	0	1	0	3	3
CO2	3	3	2	2	1	1	3	2	3	3
CO3	3	3	3	2	1	0	2	1	3	3
CO4	3	3	2	2	2	0	3	1	3	3
CO5	3	3	1	2	2	0	3	1	3	3
Average	3.0	2.8	1.8	1.8	1.4	0.2	2.4	1.0	3.0	3.0

SYLLABUS:

UNIT – I: Overview of Immune system

1.1 Introduction to basic concepts in Immunology

1.2 Innate and adaptive immunity

1.3 Cells of immune system

1.4 Organs of immune system

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/Model chart preparation of cells/organs of immune system

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT – II : Antigens

2.1 Basic properties of antigens

2.2 B and T cell epitopes, paratopes

2.3 Haptens and adjuvants

2.4 Factors influencing immunogenicity

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/ Model chart preparation of organogenesis

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT – III: Antibodies

3.1 Structure of antibody

3.2 Classes of antibodies

3.3 Functions of antibodies

3.4 Monoclonal antibodies

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/ Model chart preparation of antibodies

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT – IV: Working of Immune system

4.1 Structure and functions of major histocompatibility complexes

4.2 Exogenous pathway of antigen presentation and processing

4.3 Endogenous pathway of antigen presentation and processing

4.4. Basic properties and functions of cytokines

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/ Model chart preparation of MHC

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT – V: Immune system in health and disease

5.1 Gell and Coombs' classification and brief description of various types of hypersensitivities

5.2 Introduction to concepts of autoimmunity and immunodeficiency

5.3 General introduction to vaccines Types of vaccines, Immunization programme

5.4 Organ transplantation- Graft rejection, immune suppressors

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/ Model chart preparation of classification of Hypersensitivity

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

Additional inputs:

Autoimmune disorders

Immunodeficiency disorders

Anti-venom

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

REFERENCES BOOKS:

Judy Owen, Jenni Punt, Sharon Stranford 2013 Kuby Immunology: International Edition W. H. Freeman

Abbas AK, 2011, Cellular and Molecular Immunology 7th Ed. Elsevier Health Sciences – India.

Delves P, Martin S, Burton D, Roitt IM 2011 Roitt's Essential Immunology. 12th Ed. Wiley- Blackwell Scientific Publication, Oxford.

Murphy K, 2011 Janeway's Immunobiology. 8th Ed. Garland Science Publishers, New York.

Peakman M, and Vergani D. (2009). Basic and Clinical Immunology. 2nd edition Churchill Livingstone Publishers, Edinberg.

Richard Coico, Geoffrey Sunshine 2008 Immunology: A Short Course, 6th Edition Wiley- Blackwell

Sudha Gangal 2013 Textbook of Basic and Clinical Immunology Orient Blackswan Private Limited

- New Delhi

SEMESTER IV
Course 8 IMMUNOLOGY
BLUE PRINT

Time: 2 hrs

Max. Marks: 50

Unit	Essay 10M	Short 5 M	Marks allotted to the Unit
I	1	1	15
II	1	1	15
III	1	2	20
IV	2	2	30
V	1	1	15
Total	6	7	95

Out of 6 essays, 3 questions should be answered $3 \times 10 = 30\text{M}$

Out of 7 SAQ, 4 questions should be answered $4 \times 5 = 20\text{M}$

PITHAPUR RAJAH'S GOVT. DEGREE COLLEGE (A), KAKINADA
B.SC. HONOURS ZOOLOGY

SEMESTER IV
COURSE 8: IMMUNOLOGY

MODEL QUESTION PAPER

Time: 3hrs

Max. Marks: 50

SECTION – A

I. Answer any THREE of the following, choosing at least one from each part $3 \times 10 = 30$ M

Draw labelled diagrams wherever necessary

PART – I

1. Explain the components of the immune system and differentiate between innate and adaptive immunity. BT2
2. Describe the properties and types of antigens. BT1
3. Explain the structure and functions of different classes of antibodies. BT3

PART – II

4. Explain the structure and functions of MHC molecules. BT2
5. Describe the hypersensitivity reactions as per Gell and Coombs classification. BT2
6. Write an essay on vaccines and immunization programmes in India. BT2

SECTION – B

II. Answer any FOUR of the following

$4 \times 5 = 20$ M

1. Secondary Lymphoid organs BT3
2. Epitopes and haptens BT4
3. Monoclonal antibodies BT2
4. Exogenous pathway BT3
5. Autoimmunity — causes and examples BT2
6. Immunodeficiency disorders BT2
7. Graft rejection mechanisms BT3

QUESTION BANK

IMMUNOLOGY

SEMESTER IV — COURSE 8

Essay Questions (10M each)

1. Explain the components of the immune system and differentiate between innate and adaptive immunity .BT2
2. Describe the properties and types of antigens with examples.... BT1
3. Explain the structure and functions of different classes of antibodies.... BT2
4. Describe the structure and functions of lymphoid organs..... BT3
5. Explain the structure, classes, and role of MHC molecules.... BT2
6. Describe antigen processing and presentation through exogenous and endogenous pathways. BT2
7. Classify hypersensitivity reactions and explain any two types. BT2
8. Discuss autoimmunity and immunodeficiency disorders with examples... BT3
9. Write an essay on vaccines and immunization programmes in India. BT2
10. Explain the types, causes, and mechanisms of graft rejection... BT1

Short Answer Questions (5M each)

1. Innate immunity... BT1
2. Adaptive immunity.... BT2
3. Epitopes and haptens.....
4. Factors affecting immunogenicity..... BT2
5. Hybridoma technology.... BT3
6. Monoclonal antibodies – production and uses
7. Structure of IgG... BT1
8. Complement system – classical pathway... BT3
9. Functions of macrophages..... BT2
10. Cytokines – types and roles... BT1
11. Immunological memory... BT2
12. Examples of autoimmune diseases.... BT1
13. SCID and AIDS (brief note)... BT3
14. Live attenuated vaccines. BT2
15. Types of grafts in transplantation... BT1

COURSE8: IMMUNOLOGY

Practicals lab

Credits:1

2 hrs/week

SYLLABUS:

- 1.Demonstration of lymphoid organs (asperUGC guidelines)
- 2.Histological study of spleen, thymusandlymphnodes (throughpreparedslides)
- 3.Bloodgroup determination
- 4.Demonstration of ELISA
- 5.Demonstration of Immuno electrophoresis
- 6.TestingforTyphoid antigens by Widal test.
- 7.Differential Leukocyte Count
- 8.Isolationof monocytes from blood.
- 9.Rapid Plasma Reagin (RPR)Test

REFERENCEWEBLINKS:

<https://vlab.amrita.edu/?sub=3&brch=69>

<https://ivl1-au.vlabs.ac.in/List%20of%20experiments.html>

<https://ivl2-au.vlabs.ac.in/List%20of%20experiments.html>

<https://www.medicine.mcgill.ca/physio/vlab/immun/vlabmenuimmun.htm>

<http://www.zoologyresources.com/uploadfiles/books/dc64b77d8769325515d17c945e461b45.pdf>

<http://www.lucp.net/books-pdf/Lab%20Manual%20Dr.%20Idris%20Adewale%20Ahmed/15.%20BASIC%20IMMUNOLOGY.pdf>

https://www.avit.ac.in/lab/immunology_bioprocess_engineering_lab/download/17BTCC89/lab_manual.pdf

<https://www.urmc.rochester.edu/MediaLibraries/URMCMedia/labs/frelinger-lab/documents/Immunology-Lab-Manual.pdf>

https://webstor.srmist.edu.in/web_assets/downloads/2021/18BTC106J-lab-manual.pdf

PITHAPUR RAJAH'S GOVT. COLLEGE (A), KAKINADA
B.SC. HONOURS IN ZOOLOGY
SEMESTER IV
COURSE 8: IMMUNOLOGY
PRACTICAL
MODEL QUESTION PAPER

Time: 2 Hrs

Max. Marks: 50

I a) ABO and Rh blood grouping in humans	12 M
b) Demonstration of ELISA technique	8M
II. Answer the following experiment	
Preparation of smear for identification of lymphocytes and neutrophils	5M
III) Identification of prepared slides with labelled diagram	3X5=15
A	
B	
C	
4. Viva voce —	5M
5. Record — 5M	
Total:	50 Marks

	PR GOVERNMENT COLLEGE (AUTONOMOUS): KAKINADA DEPARTMENT OF ZOOLOGY	Program & Semester			
Course 9	Animal Biotechnology	PAPER VII HONOURS ZOOLOGY SEMESTER-IV			
Theory		3hrs/week			
Teaching	Hours Allocated :60 (Theory)	L	T	P	C
Pre-requisites:	Knowledge ON Basics of Animal Biotechnology	4	0	2	4

HOURS:60

Max. marks:50

LEARNING OBJECTIVES:

- 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, hybridoma technology, transgenic technology and their application in medicine and industry for the benefit of living organisms
- To explain in vitro fertilization, embryo transfer technology and other reproduction manipulation methodologies.
- To get insight in applications or recombinant DNA technology in agriculture, production of therapeutic proteins.
- To understand principles of animal culture, media preparation.

LEARNING OUTCOMES:

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

- CO 1: Get knowledge of the Vectors and Restriction enzymes used in biotechnology
- CO 2: Describe the gene delivery mechanism and PCR technique
- CO 3: Acquire basic knowledge on media preparation and cell culture techniques
- CO 4: Understand the manipulation of reproduction with the application of biotechnology
- CO 5: Understand the applications of Biotechnology in the fields of industry and agriculture including animal cell/tissue culture, stem cell technology and genetic engineering.

CO-PO Mapping:

The COs are mapped to POs based on the relevance on a scale of 0-3

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-'/0: No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	1	2	2	1	1	1	2	3
CO2	2	2	1	1	0	1	1	0	2	3
CO3	2	2	0	1	1	2	2	1	3	3
CO4	3	2	2	3	2	2	1	1	3	3
CO5	3	2	2	2	2	1	2	2	1	3
Average	2.6	2	1.2	1.8	1.4	1.4	1.4	1	2.2	3.0

SYLLABUS:

UNIT-I:

- 1.1 Enzymes and Vectors Restriction modification systems: Types I, II and III.
- 1.2 Mode of action, nomenclature, 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: pBR and pUC series, Bacteriophage lambda and M13 based vectors, Cosmids, BACs, YACs,

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/ Preparation of models of Cloning vectors with biodegradable material/

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT- 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

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/ Visit to any clinical testing laboratory for hands on experience of PCR Use

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity UNIT-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

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/ Visit to any clinical testing laboratory for observation of various cultures

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity UNIT-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

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/ Visit to laboratory for observation of Artificial Insemination, In vitro fertilization/model preparation of transgenic animal

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity UNIT-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

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/Case study

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

Additional topics:

1. Nature & scope of Biotechnology
2. Applications of Gene delivery
3. Trends in stem cell technology
4. ART
5. Applications of Biotechnology

REFERENCES BOOKS:

- Brown TA. (2010). Gene Cloning and DNA Analysis. 6th edition. Blackwell Publishing, Oxford, U.K.
- Clark DP and Pazdernik NJ. (2009). Biotechnology: Applying the Genetic Revolution. Elsevier Academic Press, USA
- Primrose SB and Twyman RM. (2006). Principles of Gene Manipulation and Genomics, 7th edition. Blackwell Publishing, Oxford, U.K.
- 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
- Primrose SB and Twyman RM. (2008). Genomics: Applications in human biology. Blackwell Publishing, Oxford, U.K.
- Animal Cells Culture and Media, D.C. Darling and S.J. Morgan, 1994.BIOS Scientific Publishers Limited.
- Methods in Cell Biology, Volume 57, Jennie P. Mathur and David Barnes, 1998. Animal Cell Culture Methods Academic Press.
- P.K. Gupta: Biotechnology and Genomics, Rastogi publishers (2003).
- B.D. Singh: Biotechnology, Kalyani publishers, 1998 (Reprint 2001

LIST OF DELETIONS AND ADITIONS

S. No	Unit	Addition	Justification
1	UNIT-II	PCR APPLICATIONS IN ANIMAL BIOTECHNOLOGY	Applications of PCR is very essential to learn in Biotechnology
2	UNIT II	Genetic testing	Genetic tests are available for many conditions, but vary in their clinical validity. Genetic tests can have social and ethical implications.

PR GOVERNMENT COLLEGE (A): KAKINADA
DEPARTMENT OF ZOOLOGY
SEMESTER-IV
COURSE9: ANIMAL BIOTECHNOLOGY
Blueprint

Module Name	PART I Essay Type Questions 10 marks each	Part II Short Answer Questions 5 marks each	Marks Allotted to the Chapter
1. Immunology – I (Over view of Immune system)	1	02	20
2. Immunology – II (Antigens, Antibodies, MHC and Hypersensitivity)	1	01	15
3. Biotechnology Techniques	2	02	30
4. Applications of Animal Biotechnology	1	01	15
5 module	1	01	15
6. Total	06 Of which 3 to be answered	07 Of which 4 to be answered	95 Marks including choice. Of which 50 Marks to be answered

QUESTION BANK

Unit-1 Essay questions

S.No.	QUESTION	BT LEVEL	CO	PO
1	Applications of Type II restriction enzymes in genetic engineering	BT1	CO1	PO2
2	Describe the DNA modifying enzymes and their applications	BT2	CO1	PO2
3	Write an essay on any two Cloning Vectors	BT1	CO1	PO2
4	Explain the difference between BACs, YAC vectors	BT3	CO1	PO3

Short Answer Questions

S. No.	QUESTION	BT LEVEL	CO	PO
1	State the type I restriction enzymes	BT1	CO1	PO2
2	Polymerases	BT2	CO1	PO2
3	P UC vector	BT1	CO1	PO2
4	YACs	BT1	CO1	PO2
5	M13 based vector	BT2	CO1	PO2
6	DNA polymerase	BT1	CO2	PO2

Unit-2 Essay questions

S.No.	QUESTION	BT LEVEL	CO	PO
1	Describe the deferent types of gene delivery methods	BT3	CO1	PO2
2	What is PCR? Explain the Basics of PCR	BT2	CO1	PO2

3	What is Sequencing? Explain Sanger's method of DNA sequencing	BT1	CO1	PO2
4	Illustrate the different types of Hybridization techniques in			

Short Answer Questions

S.No.	QUESTION	BT LEVEL	CO	PO
1	Gene gun	BT1	CO1	PO2
2	Traditional method of Sequencing	BT2	CO1	PO2
3	Automotive method of sequencing	BT1	CO1	PO2
4	Western Blotting method	BT1	CO1	PO2
5	Southern blotting method			

Unit-3 Essay questions

S.No.	QUESTION	BT LEVEL	CO	PO
1	What is culture? Differentiate the primary culture, secondary culture	BT1	CO1	PO2
2	Cryopreservation of cultures	BT2	CO1	PO2
3	Describe the Applications of mAb	BT1	CO1	PO2
4	Define MAb and explain Production of Monoclonal antibodies (MAb),	BT1	CO1	PO2
5	What is stem cell? Explain different Types of stem cells and their applications	BT2	CO1	PO2

Short Answer Questions

S.No.	QUESTION	BT LEVEL	CO	PO
1	Cell culture	BT1	CO1	PO2
2	Continuous cell lines	BT2	CO1	PO2
3	Cryopreservation	BT1	CO1	PO2
4	Stem cells	BT1	CO1	PO2

Unit-4 Essay questions

S.No.	question	BT LEVEL	CO	PO
1	What is the process of Invitro fertilization? Explain	BT1	CO1	PO2
2	Deescribe the Embryo transfer technology in Animals	BT2	CO1	PO2
3	Writean essay on Transgenic Animals	BT1	CO1	PO2

Short Answer Questions

S.No.	QUESTION	BT LEVEL	CO	PO	
1	Artificial Insemination	BT1	CO1	PO2	
2	Superovulation	BT2	CO1	PO2	
3	Genetransfer strategy	BT1	CO1	PO2	
4	Transgenic-sheep,	BT1	CO3	PO2	
5	Transgenic-fish	BT2	BT1	CO1	PO2

Unit-5 Essay questions

S.No.	QUESTION	BT LEVEL	CO	PO
1	Illustrate the DNA finger printing process	BT1	CO1	PO2
2	Explain Applications of biotechnology in fisheries	BT2	CO1	PO2
3	Write an essay on Gene therapy process and their application	BT1	CO3	PO2
4	Describe the Bio-informatics-concept-definition- data base types of Bio informatics	BT1	CO1	PO2

Short Answer Questions

S.No.	QUESTION	BT LEVEL	CO	PO
1	Monoculture in fishes	BT1	CO1	PO2
2	Polyploidy in fishes	BT2	CO1	PO2
3	Gene therapy	BT1	CO1	PO2
4	Bio-informatics	BT2	CO1	PO2

P.R. GOVERNMENT COLLEGE (AUTONOMOUS): KAKINADA DEPARTMENT OF
ZOOLOGY

Semester IV

Course 9: Animal Biotechnology

Model Question Paper

Time:2.Hrs.

Max Marks :50

SECTION-A

I. Answer any THREE questions choosing at least one question from each section 3x10=30Marks

PART-I

1.Applications of Type II restriction enzymes in genetic engineering	BT1	CO1	PO2
2. What is PCR? Explain the Basics of PCR	BT1	CO1	PO3
3.What is culture? Differentiate the primary culture, secondary culture	BT1	CO2	PO2
4.What is stem cell? Explain different Types of stem cells and their applications	BT1	CO2	PO2
5.What is the process of Invitro fertilization? Explain	BT2	CO1	PO3
6.Illustrate the DNA finger printing process	BT1	CO2	PO3

PART-II

SECTION-B

II. Answer any FOUR of the following. Draw labeled diagrams wherever necessary
4x5=20Marks

7.State the type I restriction enzymes	BT1	CO1	PO2
8.pUC vector	BT2	CO3	PO2
9.Gene gun	BT1	CO1	PO2
10.Cryopreservation of cultures	BT2	CO1	PO2
11.Stem cells	BT1	CO2	PO3
12.Transgenic-fish	BT2	CO1	PO2
13. Bioinformatics	BT2	CO4	PO5

Course 9: Animal Biotechnology

Practical Syllabus

Credits: 1 2hrs/week

LEARNING OBJECTIVES

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

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

SYLLABUS:

1. Cloning Vectors: Plasmid vectors: p BR and p UC series, Bacteriophage lambda and M13 based vectors, Cosmides, BACs, YACs, (Charts/Images/Models)
2. DNA quantification using DPA Method.
3. Techniques: DNA Finger printing
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. Amplifications of DNA by PCR

Note: above practical may be demonstrated in the laboratory demonstrated by V-lab

REFERENCE 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.pdfhttps://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%20%26%20VI.pdf>

P.R GOVERNMENT COLLEGE (AUTONOMOUS): KAKINADA

DEPARTMENT OF ZOOLOGY & AQUACULTURE

SEMESTER-IV

Model question Paper

COURSE-9 ANIMAL BIOTECHNOLOGY

1. DNA quantification using DPA Method	15 Marks
2. Preparation of culture media	10Marks
3. Slides/Models/Charts	3x5=15marks
Slide -A	
Slide B-	
Slide- C	
4. Record	05Marks
5. VivaVoce	05 Marks
Total	50Marks

	PITHAPUR RAJAH'S GOVT. DEGREE COLLEGE (A) KAKINADA.	PROGRAM & SEMESTER B.SC. HONOURS ZOOLOGY (MAJOR) SEMESTER-IV			
COURSECODE: 10	WILDLIFE AND CONSERVATION BIOLOGY				
THEORY	CREDITS:3	3 HRS/WEEK			
TEACHING	HOURS ALLOCATED:60 (THEORY)	L	T	P	C
PRE- REQUISITES:	CONSERVATION OF WILD LIFE	4	0	2	4

HOURS:60

Max.Marks: 50

COURSE OUTCOMES

1. **CO1:** To grasp the principles of wildlife ecology, identify key threats to wildlife in India, and evaluate conservation approaches.
2. **CO2:** To Recognize the importance and types of protected areas (National Parks, Sanctuaries, Biosphere Reserves) and their components in habitat conservation.
3. **CO3:** To apply wildlife management strategies and legislation to protect and manage endangered species and their habitats.
4. **CO4:** To Examine the complexities of human-wildlife interactions and propose effective mitigation strategies.
5. **CO5:** To Discuss national and international conservation initiatives, including conventions (CITES, IUCN, CBD, Ramsar) and their role in biodiversity protection.

Bottom of Form

Learning outcomes

Some of the learning outcomes for a course in **WILDLIFE AND CONSERVATION BIOLOGY**

This course will provide students with a deep knowledge in acquiring laboratory skills, by completion of the course the graduate shall able to

- ☞ Know the Concept of wildlife and reasons for their depletion
- ☞ Know the wild life management strategies
- ☞ Know the Importance of ecologically sensitive areas ☞ Know the human Impact on environmental resources
- ☞ Understand the human wildlife interaction

• Top of Form

SYLLABUS

UNIT – 1

1.1 Wildlife wealth of India & threatened wildlife.

1.2 Reasons for wildlife depletion in India. Wildlife conservation approaches and limitations.

1.3 National Parks, Sanctuaries and Biosphere Reserves, cores and Buffers, Nodes and corridors. Community Reserve and conservation Reserves

UNIT – I1

2.1 Red Data Book and Conservation status (endangered, vulnerable, rare, threatened and near threatened species)-definitions.

2.2 Wild life Trade & legislation- Assessment, documentation, Prevention of trade

2.3 Policies and laws in Wild life management (national) and ethics.

UNIT-III

3.1 Biodiversity extinction and conservation approaches- Identification and prioritization of Ecologically sensitive area (ESA).

3.2 Regional and National approaches for biodiversity conservation.

3.3 Population viability analysis-conceptual foundation, uses of PVA models.

UNIT-IV

4.1 National and International efforts for conservation- Information on CITES, IUCN, CBD

4.2 International agreements for conserving marine life. Convention on wetlands of International Importance (Ramsar convention).

4.3 Human impact on Terrestrial and Aquatic resources. Overview of conservation of Forest & Grassland resources

UNIT-V

5.1 Human – wildlife interactions

5.2 Strategies to reduce human-wildlife interactions

5.3 Role of Government and NGOs in controlling human-wildlife interactions Socio-economic issues related to human-wildlife interactions

Additional input: Human impact and the effects of poaching on the wild life of Coringa wildlife sanctuary.

REFERENCES:

1. M.Kato. The Biology of Biodiversity, Springer.

2. J.C. Avise. Molecular Markers, Natural History and Evolution, Chapman & Hall, New York.

3. E.O. Wilson. Biodiversity, Academic Press, Washington.

4. G.G. Simpson. Principle of animal taxonomy, Oxford IBH Publishing Company.

5. E. Mayer. Elements of Taxonomy. E.O. Wilson. The Diversity of Life (The College Edition), W.W. Northem& Co.
6. B.K. Tikadar. Threatened Animals of India, ZSI Publication, Calcutta.

SUGGESTED ACTIVITIES:

1. Visit to near by Coaringa Wild life sanctuary and report the activity with pics
2. Visit to Kambalakonda Wild life sanctuary @ Vishakhapatnam and report the activity with pics

Co-Curricular Activities Mandatory:

1. **For Teacher:** Training of students by the teacher to get data steps for various conservation methods to be practised in order to protect the fauna and flora within their localities.
2. **For Student:** Students shall (individually) visit – various types of Museums. Observe the different education models and make observations on various species present there, the procedures practiced there 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 of place visited, observations made, findings and acknowledgements

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	1	2	2	1	2	2	3	2	3	2	2	2	2
CO2	2	1	2	2	1	1	2	3	1	2	2	2	2
CO3	1	1	2	3	2	1	1	2	2	2	1	2	1
CO4	2	2	1	2	1	2	2	2	2	2	2	2	2
CO5	2	2	1	1	1	2	2	1	1	1	1	1	2

P.R. GOVT. COLLEGE (AUTONOMOUS), KAKINADA
TITLE: COURSE 10: WILDLIFE AND CONSERVATION BIOLOGY
BLUE PRINT FOR QUESTION PAPER SETTER

MODULE NO.	. ESSAY QUESTIONS 10	SHORT ANSWER QUESTIONS 5	MARKS ALLOTTED TO THE UNIT
MODULE-1	2	1	25
MODULE-2	1	1	15
MODULE-3	1	2	20
MODULE-4	1	2	20
MODULE-5	1	1	15
TOTAL	Out of 06 questions 3 should be answered 3X10=30	Out of 07 questions 4 should be answered 4X5=20	95

**PITHAPUR RAJA'S GOVT. COLLEGE (AUTONOMOUS),
KAKINADA
DEPARTMENT OF ZOOLOGY AND AQUACULTURE
MAJOR ZOOLOGY SEMESTER-IV- WILDLIFE AND CONSERVATION BIOLOGY
MODEL QUESTION PAPER**

Time: 2 hrs.

Max Marks: 50

SECTION - A

PART- I

Answer Any THREE of the following questions by choosing at least one question in each section (Draw labelled diagrams wherever necessary)

3X10=30

S. N o	Questions	BT Lev el	CO	P O	Mark s
1	Give a detailed note on the Wildlife wealth of India.	BT1	1	2	10
2	Describe the effectiveness of National parks in preventing species extinction by using specific global examples.	BT3	2	0	10
3.	List out the various legislations made for prevention of wildlife trade in India.	BT3	2	0	10

PART – II

S.No	Questions	BT Leve l	CO	P O	Mark s
3	Describe the regional approaches for biodiversity conservation.	BT2	1	2	05
4	Human impact on terrestrial and aquatic resources. Discuss ?	BT1	2	2	05
5	List out the various strategies that can reduce the Human – wildlife interactions.	BT1	1	2	05

SECTION - B

II. Answer any FOUR of the following: Draw labeled diagrams wherever necessary

4x5=20 M

S.No	QUESTION	BT LEVEL	CO	PO	MARKS
7	Threatened Species	BT1	2	1	01
8	Ethics	BT2	0	1	01
9	ESA	BT3	1	2	01
10	Conceptual foundation	BT2	2	2	01
11	CITES	BT1	2	1	01
12	Wetlands	BT3	0	1	01
13	NGOs	BT2	1	2	01

P.R. Govt. College (Autonomous),
Kakinada
Semester-IV
TITLE: WILDLIFE AND CONSERVATION BIOLOGY
PAPER: 10 - Question Bank

UNIT: I

ESSAY QUESTIONS

1. Give a detailed note on the Wildlife wealth of India. BT1
2. Discuss the various reasons for the depletion of wildlife in India- BT2
3. Describe the effectiveness of National parks in preventing species extinction by using specific global examples. BT3

SHORT ANSWER QUESTIONS:

- 1 Threatened Species - BT1
- 2 Nodes & corridors - BT2
- 3 Biosphere reserves – BT3

UNIT-II

Essay questions

1. Write an essay on Red data book and its Conservation status. -BT1
2. List out the various legislations made for prevention of wildlife trade in India. - BT2
3. Give a clear picture on the policies and laws of Wildlife management. -BT3

SHORT ANSWER QUESTIONS

1. Vulnerable Sps – BT1
2. Wild life trade – BT2
3. Ethics – BT2

UNIT – III

Essay questions

1. Write an essay Biodiversity extinction & Conservation approaches. -BT1
2. Describe the regional approaches for biodiversity conservation.BT2
3. Give a detailed note on the population viability analysis and its uses. -BT1

SHORT ANSWER QUESTIONS:

1. ESA. -BT1
- 2.PVA – BT2
3. Extinction. - BT2
4. Conceptual foundation –BT2

UNIT – IV

Essay questions

1. Write an essay on the National & International efforts for conservation. BT1
2. Give a detailed note on the international agreements for conserving marine life .BT2
3. Human impact on terrestrial and aquatic resources. Discuss? BT1

SHORT ANSWER QUESTIONS:

1. CITES - BT1

2. IUCN. BT2
3. Wetlands.BT3
4. Human Impact. BT1

UNIT – V

Essay questions

1. Write an essay on Human – wildlife interactions with examples. BT2.
2. List out the various strategies that can reduce the Human – wildlife interactions. –BT1
3. Give a detailed description on the Govt. role in controlling Human – wildlife interactions. -BT3

SHORT ANSWER QUESTIONS:

1. NGOs. BT 2
2. Wildlife Interactions. BT1
3. Socio economic issues BT 3

SEMESTER-IV

MAJOR ZOOLOGY PAPER – 10 – WILDLIFE AND CONSERVATION BIOLOGY PRACTICALS 2 HRS/WEEK CREDITS-1

SYLLABUS

COURSE OBJECTIVES:

To understand the importance of various biomes

To understand and gain knowledge of animal architecture

SYLLABUS:

1. Using photographs / paintings / coloured drawings identify and study ecological role of characteristic animal species (major representative species only) of various Biomes.
2. Identify marine and fresh water planktons (preserved water samples may be used).
3. Study of animal architecture (photographs / diagram / abandoned specimen); Hive of honey bee, nest of COURSE wasp, nest of potter wasp, Mount of termite, Nests of Weaver Bird and tailor bird.
4. Using photographs / paintings / coloured drawings identify and study distribution and ecological role of common bivalves and gastropods that occur along a sea-shore.
5. Compare and interpret given sonograms of bird calls (any two e.g. Courtship calls, Alarm calls)
6. On a phytogeographic map of India locate & demarcate major sanctuaries / national parks

WEB RESOURCES FOR LAB:

https://www.naturepl.com/pictures/pdfs/NPL_Architecture.pdf

<https://youtu.be/31PWjb7Do1s>

PR GOVT COLLEGE AUTONOMOUS
KAKINADA
MAJOR ZOOLOGY
PAPER -10
WILDLIFE AND CONSERVATION BIOLOGY
PRACTICAL MODEL QUESTION PAPER - MAX MARKS-50

Part A

- | | |
|--|----------------------|
| 1. Identify the given photographs / paintings / coloured drawings | 3X4= 12 Marks |
| a. | |
| b. | |
| c. | |
| 2. Identify the given marine and fresh water planktons | 2X2= 8 Marks |

Part B

- a. Study of animal architecture (photographs / diagram / abandoned specimen.) **10 Marks**
- b. Locate & demarcate the Coringa wildlife sanctuary on a phytogeographic map of India

5 Marks

Part C — Field visit report

(5 Marks)

Part D — Viva Voce

(5 Marks)

Part E — Record and Observation Book

(5 Marks)

TOTAL- 50 MARKS

SEMESTER V & IV
2023-2024 ADMITTED BATCH ONWARDS

	PITHAPUR RAJAH'S GOVT. DEGREE COLLEGE (A) KAKINADA.	PROGRAM & SEMESTER B.SC. HONOURS IN ZOOLOGY (MAJOR) SEMESTER-V			
COURSECODE: 12	POUNTRY MANAGEMENT-I (POULTRY FARMING				
THEORY	CREDITS:3	3 HRS/WEEK			
TEACHING	HOURS ALLOCATED:60 (THEORY)	L	T	P	C

PRE-REQUISITES:	POULTRY FARMING	4	0	2	4
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HOURS:60

Max.Marks: 50

COURSE OUTCOMES

1. **CO1:** Explain the importance of poultry farming and its essentiality in India
 2. **CO2:** To acquire knowledge on the importance of poultry products.
 3. **CO3:** Have knowledge on the various types of birds which can be farmed under poultry.
 4. **CO4:** To get information on the production of egg & meat in India and their necessity in nutrition.
 5. **CO5:** To have a basic idea on the various types of indigenous breeds and their economic importance
 6. **CO6:** To recommend the improved varieties to be farmed in Indian poultry systems.
 7. **CO7:** To improve knowledge on the systems & research institutes working on the poultry and its development.
-

Learning outcomes

Some of the learning outcomes for a course in **Poultry Farming-I**

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

- Evaluate the status of Indian Poultry Industry
 - Explain the Scientific Poultry keeping
 - Compare the diversified Poultry practices
 - Inspect the different breeds of chicken
-

Unit 1 Indian poultry Industry

- 1.1 Importance of poultry farming and poultry development in India.
- 1.2 Present status and future prospectus of poultry Industry
- 1.3 Classification of poultry based on genetics Utility

Unit -2 Scientific Poultry Keeping

- 2.1 Modern breeds of Chicken
- 2.2 Present day egg production lines- meat production lines
- 2.3 Mini breeds- dwarfism in mini-Leghorns

Unit-3 Diversified Poultry

- 3.1 Ducks and Geese-classification- rearing system-classification-advantages
- 3.2 Guinea fowls - guinea fowl farming in India-Production-varieties
- 3.3 Emu-rearing- Economical aspects-commercial products

3.4 **Unit-4** Desi Chickens:

- 4.1 Indigenous breeds and economical aspects of desi chicken
- 4.2 Indigenous breeds-Aseel-Chittagong-Kadaknath-Bursa
- 4.3 Improved varieties in India – Giriraja-Vanaraja-Girirani-Kalinga brown, Gramapriya,Swarnandhra

Unit -5 Breeds from Central Avian Research Institute – Izatnagar

- 5.1 CARI Nirbheek - CARI- Shyama-HITCARI (Naked Neck Cross)
- 5.2 CARI- Priya Layer, CARI- Sonali Layer,
- 5.3 CARIBRO-VISHAL, CARI-RAINBRO,
- 5.4 Nandanam chicken-I, Nandanam Chicken-II, Nandanm-Quail

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above

REFERENCES:

1. Text Book of Poultry Science, P V Sreenivasaiah, Write and Print Publications, ISBN No. 9788192970592, 8192970590
2. Poultry Science Practices, Nilothpal Ghosh, CBS Publication & Distributions, 2015
3. Principles of Poultry Science, 1996, CAB Publishers, ISBN 9780851991221
4. A Text Book of Animal Husbandry, C. C. Banerjee, Oxford and IBH, Publish Co, ISBN: 9788120412606 Web sources:
5. <https://www.drvet.in/p/e-books.html>
6. <https://byjus.com/biology/animal-husbandry-poultry-farming/>
7. https://www.helpforag.app/2018/02/livestock-production-and-management- lpm_14.html?m=1

Co-Curricular Activities Mandatory:

1. **For Teacher:** Training of students by the teacher in laboratory/field in various steps of poultry techniques, on the advanced farming procedures in poultry – Training of students on other employability skills in the poultry sector.
2. **For Student:** Students shall (individually) visit – various types of poultry systems. Observe the different types of indigenous breeds being farmed and make observations on procedures practiced there 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 of place visited, observations made, findings and acknowledgements

CO PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3
CO 1	1	2	2	1	2	2	3	2	3	2	2	2	2
CO 2	2	1	2	2	1	1	2	3	1	2	2	2	2
CO 3	1	1	2	3	2	1	1	2	2	2	1	2	1
CO 4	2	2	1	2	1	2	2	2	2	2	2	2	2
CO 5	2	2	1	1	1	2	2	1	1	1	1	1	2

P.R. GOVT. COLLEGE (AUTONOMOUS), KAKINADA
TITLE: COURSE 12: POULTRY MANAGEMENT - I
BLUE PRINT FOR QUESTION PAPER SETTER

MODULE NO.	ESSAY QUESTIONS 10 M	SHORT ANSWER QUESTIONS 5M	MARKS ALLOTTED TO THE UNIT
MODULE-1	1	1	15
MODULE-2	1	2	20
MODULE-3	1	2	20
MODULE-4	2	1	25
MODULE-5	1	1	15
TOTAL	Out of 06 questions 3 should be answered 3X10=30	Out of 07 questions 4 should be answered 4X5=20	95

**PITHAPUR RAJA'S GOVT. COLLEGE (AUTONOMOUS),
KAKINADA
DEPARTMENT OF ZOOLOGY AND AQUACULTURE
MAJOR ZOOLOGY SEMESTER-V- POULTRY MANAGEMENT - I
MODEL QUESTION PAPER**

Time: 2 hrs.

Max Marks: 50

SECTION - A

Answer Any THREE of the following questions by choosing at least one question in each Part (Draw labelled diagrams wherever necessary)

PART- I

3X10=30M

S.No	Questions	BT Level 1	CO	P O	Marks
1	Discuss the present and future prospectus of poultry industry in India	BT1	1	2	10
2	Describe the various types of mini breeds and add a note on dwarfism in leghorns.	BT2	2	0	10
3.	Write an essay on Emu-farming its economic aspects and the various commercial products of it.	BT2	2	0	10

PART- II

S.No	Questions	BT Level	CO	P O	Mark s
4	Give a detailed note on the indigenous breeds and the economic aspects of desi chicken	BT1	1	2	05
5	Improved varieties in India – Explain. Add a note on any three varieties	BT2	2	2	05
6	Discuss the functions and activities of CARI in brief.	BT2	1	2	05

SECTION B

Answer any FOUR of the following: Draw labeled diagrams wherever necessary

4x5=20 M

S.No	QUESTION	BT LEVEL	CO	PO	MARKS
7	Write a short note on poultry development in India	BT1	2	1	01
8	Modern chick breeds	BT1	0	1	01
9	Egg production in AP	BT2	1	2	01
10	Write a short note on Duck rearing system.	BT3	2	2	01
11	Guinea fowl	BT1	2	1	01
12	Kadakhnath	BT1	0	1	01
13	HITCARI	BT2	1	2	01

**P.R. Govt. College (Autonomous),
Kakinada
Semester-V
TITLE: POULTRY MANAGEMENT - I PAPER: 12 -
Question Bank**

UNIT: I

ESSAY QUESTIONS

- 1. Discuss the development of poultry farming in India. BT1**
- 2 Explain the importance of poultry and its farming- BT2**
- 3 Give a detailed note on the present status and future prospectus of poultry industry. BT1**
- 4 Classify the poultry breeds basing on their genetic utility. –BT1**

SHORT ANSWER QUESTIONS:

- 1 . Poultry farming - BT1**

- 2 . Future prospects of poultry - BT2
- 3 , Genetic utility - BT1

UNIT-II

Essay questions

1. Write an essay on modern chick breeds. -BT1
2. Discuss the present-day egg production lines in AP. - BT2
3. Describe the various mini breeds and add a note on dwarfism in Leghorns. -BT3

SHORT ANSWER QUESTIONS

1. Rhode Island Reds – BT1
2. Cornish – BT2
3. Leghorn – BT2
4. Meat production – BT2
5. Dwarfism - BT1

UNIT – III

Essay questions

1. **Classify the various types of rearing systems and their advantages.-BT1**
2. **Write an essay on the various breeds of Ducks.BT2**
3. **Describe the farming of Guinea fowl in India and its varieties.-BT1**
4. **Write an essay on emu farming and its economic importance – BT2**
5. **Give a detailed note on the commercial products of Emu. – BT2**

SHORT ANSWER QUESTIONS:

1. Embden Gees. -BT1
2. Malard Duck – BT2
3. Pearl grey Guinea fowl. - BT2
4. Gunia foul farming? –BT2
- 5 Emu economic importance-BT3
6. Emu Oil - BT2

UNIT – IV

Essay questions

1. Write an essay on the indigenous chick breeds and their economics aspects. BT1
2. Describe the importance of Bursa.BT2
3. list out the various improved indigenous varieties and add a note on Giriraja ?BT1
4. List out the various types of desi chicken and their economic importance. – BT 2

SHORT ANSWER QUESTIONS:

1. Kadaknath - BT1
2. Aseel. BT2
3. Economic aspects of Indigenous breeds.BT2
4. Vanaraja. BT1
5. Girirani. BT1
6. Kalinga brown BT2
7. Swarnandra BT 1

UNIT – V**Essay questions**

1. Define CARI and list out the various types of research activities carried out by CARI. BT1.
2. Differentiate Priya layer and Sonali layer. –BT1
3. Write a detailed note on RAINBRO and its importance-BT1
4. Discuss the farming & economic importance of Nandanam Quail.-BT2

SHORT ANSWER QUESTIONS:

1. CARI Shyam. BT 2
2. Naked Neck Cross. BT1
3. Sonali Layer. BT3
4. CARIBRO VISHAL BT2
5. Nandanam Chicken. BT 1

SEMESTER-V**MAJOR ZOOLOGY PAPER – 12 – POULTRY MANAGEMENT - I
PRACTICALS 2 HRS/WEEK CREDITS-1****LEARNING OUTCOMES:**

On successful completion of this practical course, student shall be able to:

- Identify different types of Poultry rearing practices
- Evaluate the efficacy of different types of poultry practices in maximizing yield
- Understand the importance of different hybrid breeds in poultry

SYLLABUS:

1. Different types of Poultry rearing (Students has to observe and draw the different types of poultry rearing systems)
2. Different types of poultry Housing - Models / Images/charts
3. Different layer breeds images/charts/ Models (Observation of characters)
4. Types of broilers images/charts/ Models (Identification of important Characters)
5. CARI breeds characters –images/charts 6. Nandanam breeds- images/charts (Identification of characters)

*** (This practical is 70 % (Web based /virtual) 30% physical: student and teachers must browse the web for the specimens models – write down the important characters based on the web resources)

REFERENCES:

1. A Text Book of Animal Husbandry, C. C. Banerjee, Oxford and IBH, Publish Co, ISBN: 9788120412606
 2. http://www.agritech.tnau.ac.in/expert_system/poultry/Poultry%20House%20Construction.html
 3. <https://petkeen.com/best-chicken-breeds-for-eggs/>
 4. <https://garden.decorexpro.com/en/hozyajstvo/ptitsevodstvo/porody-brojlernyh-kur-s-foto-iopisaniem.html>
- Co-Curricular Activities:** a) Mandatory:
1. For Teacher: Training of students by the teacher in laboratory and field on the techniques of identification of layers, broilers and management practices in poultry.
 2. For Student: Students shall Individually visit a Poultry farm, make observations and report on the Rearing, Housing, Brooding, Feeding and water management activities. The student shall submit a handwritten Fieldwork/Project work Report on the observations along with pictures in the given format not exceeding 10 pages to teacher.
 3. Max marks for Fieldwork/Project work Report: 05.
 4. Suggested Format for Fieldwork/Project work: Title page, student details, index page, detailsof place visited, observations made, findings and acknowledgements.
 5. Unit tests. (IE)
- b) Suggested Co-Curricular Activities
1. Web resources – visiting the web sites of CARI-IZATNAGA <https://cari.icar.gov.in> procuring additional information on the poultry breeds
 2. Web resources- visiting the web site of NANADANAM http://www.tanuv.ac.in/ipmmadhavaram_tech.html
 3. Collection of additional data on different types of Poultry breeds
 4. Seminar, Assignment, Group discussion. Quiz, Collection of Material, Invited Lecture, Video preparation etc.

PR GOVT COLLEGE
AUTONOMOUS KAKINADA
MAJOR ZOOLOGY
PAPER -12
POULTRY MANAGEMENT - I
PRACTICAL MODEL QUESTION PAPER - MAX MARKS-50

Part A — Major Experiment

20 Marks

1. Different types of poultry housing systems.

Part B — Identification

(4X4= 16 Marks)

Identify the given chart/model/specimen. Draw a neat labelled diagram

a) White leghorn

b) Emu

c) Chittagong

d) Nandanam Quail

Part C — Field visit report

(4 Marks)

Part D — Viva Voce

(5 Marks)

Part E — Record and Observation Book

(5 Marks)

TOTAL- 50 MARKS

V SEMESTER PITHAPUR RAJAH'S GOVT. DEGREE COLLEGE

(A) KAKINADA.

DEPARTMENT OF ZOOLOGY & AQUACULTURE

SEMESTER-V

COURSE 13: POULTRY MANAGEMENT-II

(POULTRY PRODUCTION AND MANAGEMENT)

Theory Credits: 3

3 hrs/week

COURSE OUTCOMES:

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

- & Suggest measure for Health care in Poultry
- & Evaluate the economics of poultry production
- & Elaborate the poultry Breeder flock management Differentiate
- & the poultry hatchery practices

SYLLABUS:

Unit-1 HEALTH CARE

- 1.1 Common poultry diseases: bacterial, viral, fungal, parasitic and nutritional deficiencies.
- 1.2 Vaccination schedule for commercial layers and broilers: factors that govern vaccination schedule; vaccination principles type, methods, pre and post vaccination care.
- 1.3 Disinfection: Types of disinfectants; mode of action; recommended procedure; precaution and handling.

Unit-2 ECONOMICS

- 2.1 Economics of layer and broiler production
- 2.2 Projects reports in different systems of rearing for layer & broilers.
- 2.3 Feasibility studies on poultry rearing- in context of small units and their profitability.
- 2.4 Export/import of poultry and poultry products.

Unit-3 BREEDER FLOCK MANAGEMENT

Layer and broiler breeder flock management housing & space requirements
Different stage of management during life cycle; Light management during growing and laying period, Artificial insemination.

Feeding: Feed restriction, separate male feeding. Nutrient requirement of layer and broiler breeders of different age groups.

Unit-4 BREEDER HEALTHCARE

4.1 Vaccination of breeder flock; difference between vaccination schedule of broilers and commercial birds.

4.2 Common diseases of breeders (Infectious and metabolic disorders)-prevention.

4.3 Fertility disorder- etiology, diagnosis and corrective measures. Selection and culling of breeder flocks

Unit-5 HATCHERY PRACTICES

5.1 Management principles of incubation.

5.2 Factors affecting fertility and hatchability. Selection, care and incubation of hatching eggs. Fumigation; sanitation and hatchery hygiene.

5.3 Importance of hatchery records, break even analysis of unhatched eggs.

5.4 Computer applications for hatchery management

REFERENCES:

1. HVS Chauhan, S. Roy, Poultry Diseases, Diagnosis and Treatment, New Age International Publishers-2018

Web resources:

2. <https://www.drvet.in/p/e-books.html>

3. <https://byjus.com/biology/animal-husbandry-poultry-farming/>

4. https://www.helpforag.app/2018/02/livestock-production-and-management-lpm_14.html?m=1

CO-POMapping:

[illegible]

Pithapur Rajah's Govt. Degree College (A) Kakinada.
DEPARTMENT OF ZOOLOGY & AQUACULTURE
SEMESTER-V
COURSE 13: POULTRY MANAGEMENT-II
(POULTRY PRODUCTION AND MANAGEMENT) MODEL
QUESTION PAPER

Time: 2 hrs

Max. Marks :50

SECTION- A

Note: Answer any THREE questions choosing at least one question from each section. Draw the diagrams wherever necessary
3 X10 = 30

PART – I

1. Write an essay on the common diseases affecting poultry birds
2. Explain the economics of layer and broiler production
3. Write an essay on the housing and space requirements for the layer breeder flock management

Part – II

4. Write an essay on vaccination in breeder flock
5. Explain the factors affecting fertility and hatchability in poultry birds
6. What are the various hatchery records to be maintained in a poultry farm. Explain their importance

SECTION-B

Answer any Four of the following.

4x5=20

7. Types of disinfectants in poultry
8. Feasibility studies in poultry rearing
9. Artificial insemination in poultry
10. Nutrient requirement in layer birds
11. Fertility disorder in poultry
12. Any two infectious diseases in breeders
13. Management principles of incubation

Pithapur Rajah's Govt. College (A) Kakinada.
DEPARTMENT OF ZOOLOGY & AQUACULTURE
SEMESTER-V
COURSE 13: POULTRY MANAGEMENT-II
(POULTRY PRODUCTION AND MANAGEMENT)

Time: 2 hrs

Max. Marks :50

BLUE PRINT FOR QUESTION PAPER

Unit	Essay	Short
I	1	1
II	1	1
III	1	2
IV	1	2
V	2	1
	Out of 6, 3 questions should be answered 3X10=30M	Out of 7, 4 questions should be answered 4X5=20M

Pithapur Rajah's Govt. Degree College (A) Kakinada.
DEPARTMENT OF ZOOLOGY & AQUACULTURE
SEMESTER-V
COURSE 13: POULTRY MANAGEMENT-II
(POULTRY PRODUCTION AND MANAGEMENT)
QUESTION BANK

ESSAY TYPE QUESTIONS

1. Write an essay on the common diseases affecting poultry birds
2. Write about the vaccination schedule for commercial layers. Add a note on the factors which govern vaccination schedule in poultry
3. Explain the economics of layer and broiler production

4. Explain the preparation of project report in different systems of rearing of layer birds
5. Write an essay on the export and import of poultry and poultry products
6. What is a feasibility study? Explain feasibility studies on poultry rearing in the context of small units
7. Write an essay on the housing and space requirements for the layer breeder flock management.
8. Write an essay on the housing and space requirements for the broiler breeder flock management.
9. Explain different stages of management during life cycle in poultry
10. Write an essay on vaccination in breeder flock
11. Explain the common diseases affecting breeder birds
12. Explain the etiology, diagnosis and corrective measures for fertility disorder in poultry birds
13. Explain the factors affecting fertility and hatchability in poultry birds
14. What are the various hatchery records to be maintained in a poultry farm. Explain their importance.
15. Write an essay on selection, care and incubation of hatching eggs

SHORT ANSWER TYPE QUESTIONS

1. Types of disinfectants in poultry
2. pre and post vaccination care
3. Coccidiosis
4. Avian influenza
5. Fowl pox
6. Mareks disease
7. New castle disease
8. Aspergillosis

9. Colibacillosis
10. Fowl Typhoid
11. Pullorum disease
12. Feasibility studies in poultry rearing
13. Light management during growing and laying
14. Artificial insemination in poultry
15. Nutrient requirement in layer birds
16. Fertility disorder in poultry
17. Culling of breeder flocks
18. Any two infectious diseases in breeders
19. Management principles of incubation
20. Hatchery records
21. Break even analysis of unhatched eggs
22. Fumigation
23. sanitation and hatchery hygiene
24. Computer applications for hatchery management

Pithapur Rajah's Govt. Degree College (A) Kakinada.

DEPARTMENT OF ZOOLOGY & AQUACULTURE

SEMESTER-V

COURSE 13: POULTRY MANAGEMENT-II

(POULTRY PRODUCTION AND MANAGEMENT)

Practical Credits: 1

2 hrs/week

LEARNING OUTCOMES:

On successful completion of this practical course, student shall be able to:

- & Identify Poultry diseases by observation
- & Analyze Poultry establishment feasibility
- & Understand the Poultry Records

SYLLABUS:

1. Poultry Viral diseases – Observation of histopathological slides
2. Poultry Fungal Diseases- Observation of histopathological slides
3. Poultry Bacterial Diseases-Observation of histopathological slides
4. Feasibility study of Poultry establishment: (Preparation of feasibility study report with given parameters)
5. Rearing of Layers – (Preparation of Flow chart
6. Rearing of broiler- Flow chart
7. Hatchery records- Model study/analysis- Report with modified data

REFERENCES:

1. HVS Chauhan, S. Roy, Poultry Diseases, Diagnosis and Treatment, New Age International Publishers-2018
2. Flow chart hatchery: <http://lms.tanuvas.ac.in/mod/resource/view.php?id=45106>
3. Feasibility report:
<https://www.manage.gov.in/stry&fcac/content/19.%20Project%20Report%20on%20Layer%20Poultry.pdf>

Co-Curricular Activities

a) Mandatory:

1. For Teacher: Training of students by the teacher laboratory and field on skills in different practices employed in poultry with regard to the disease management – analysis of poultry project- preparation of flow chart – Observation of Poultry records – computerization activities
2. For Student: students shall (individually) visit a Layer/ Broiler Poultry farming places (small scale/corporate), make observations on practices- resources – management and marketing - analysis and submit a handwritten Fieldwork/Project work Report of 10 pages with necessary images.
3. Max marks for Fieldwork/Project work Report: 05.

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

6. (IE): Unit tests.

b) Suggested Co-Curricular Activities

1. Preparation of Poultry diseases charts

2. Preparation of feasibility report poultry establishment with different variables

3. Seminar, Assignment, Group discussion. Quiz, Collection of Material, Invited Lecture, Video preparation etc.

Pithapur Rajah's Govt. Degree College (A) Kakinada.

DEPARTMENT OF ZOOLOGY & AQUACULTURE

SEMESTER-V

COURSE 13: POULTRY MANAGEMENT-II

(POULTRY PRODUCTION AND MANAGEMENT) PRACTICAL MODEL
PAPER

MODEL PAPER

Time: 2hrs

Max Marks: 50

1. Identification and write notes on the following 3X5=15M

A. Viral disease-histopathological slide

B. Bacterial fungal histopathological slide

C. Fungal histopathological slide

2. Preparation of feasibility study report for poultry establishment -10M

3. Rearing of layers/broilers-flow chart -5M

4. Hatchery records -5M

5. Field work/Project work -5M

6. Viva 05M

* * * *

Course Outcomes:

On Completion of the course the students will be able to-	
CO1	Evaluate the present status of aquaculture at the Global level and National level
CO2	Classify different types of ponds used in aquaculture
CO3	Demonstrate induced breeding of carps
CO4	Acquire critical knowledge on commercial importance of shrimps
CO5	Identify fin and shell fish diseases

CO-PO Mapping:

The COs are mapped to POs based on the relevance on a scale of 0-3

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-'/0: No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	2	2	1	2	3	3	2	3	3
CO2	2	2	2	1	2	2	2	2	3	3
CO3	2	2	1	2	2	3	2	2	3	3
CO4	2	2	1	1	2	2	2	1	3	3
CO5	2	2	1	2	2	2	3	2	3	3
Average	2.0	2.0	1.4	1.4	2.0	2.4	2.4	1.8	3.0	3.0

Syllabus

UNIT I:

- 1.1. Present status of Aquaculture – Global and National scenario.
- 1.2 Major cultivable species for aquaculture: freshwater, 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 II:

- 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 Physico-chemical conditions of soil and water optimum for culture (Temperature, depth, turbidity, light, water, PH, BOD, CO2 and nutrients)

UNIT III:

- 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

3.4 Culture of Indian major carps - post-stocking management

UNIT IV:

3.5 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 V:

5.1 Viral diseases of Fin Fish & shell fish.

5.2 Fungal diseases of Fin & Shell fish.

5.3 Bacterial diseases of Finfish & Shell fish

5.4 Prophylaxis in aquaculture.

Additional Inputs:

1. Future scenario of aquaculture
2. Need of liming of pond
3. Sources of seed for aquaculture practices
4. Recent pathogens affecting the aquaculture farms

REFERENCES:

Pillay TVR & M.A. Dill, 1979. Advances in Aquaculture. Fishing News Books Ltd., London

Stickney RR 1979. Principles of Warm Water Aquaculture. John Wiley & Sons Inc.1981

Boyd CE 1982. Water Quality Management for Pond Fish Culture. Elsevier Scientific Publishing Company.

Bose AN et.al. 1991. Coastal Aquaculture Engineering. Oxford & IBH Publishing Company Pvt. Ltd.

Web Links:

http://www.fao.org/fishery/docs/CDrom/FAO_Training/FAO_Training/General/x6708e/x6708e06.htm

http://aquaticcommons.org/1666/1/Better-Practice3_opt.pdf

<https://www.notesonzoology.com/india/fishery/fish-diseases-symptoms-and-control-fishery/871>

P.R. GOVERNMENT COLLEGE (A) KAKINADA
DOMAIN SUBJECT: ZOOLOGY SEMESTER–V COURSE
14 A: SUSTAINABLE AQUACULTURE MANAGEMENT

BLUE PRINT

Module No	Essay Type Questions 10 marks each	Short Answer Questions 5 marks each	Marks Allotted to the Chapter
UNIT I	1	01	15
UNIT II	1	02	20
UNIT III	2	01	25
UNIT IV	1	02	20
UNIT V	1	01	15
5.Total	06 Of which 3 to be answered	07 Of which 4 to be answered	95 Marks including choice. Of which 60 Marks to be answered

NOTE: The question paper setters are requested to kindly adhere to the format given in the table

P.R. GOVERNMENT COLLEGE(A), KAKINADA
CHOICE BASED CREDIT SYSTEM
FOUR– YEAR B.SC. (HONS) DOMAIN SUBJECT:
ZOOLOGY SEMESTER V - COURSE 14 A
SUSTAINABLE AQUACULTURE MANAGEMENT
MODEL PAPER

SECTION-A

Answer any THREE questions choosing at least one question from each section. Draw the diagrams wherever necessary 3X10 =30

PART

-I

1. Describe the present status of Aquaculture in Global and National Scenario
2. Write an essay on Design and construction of a fish farm
3. What are the Physico -chemical conditions of water required for aquaculture

PART - II

4. Write an essay on Induced breeding
5. Explain the mixed culture of Fish and Prawn
6. Explain viral diseases in Fin Fish

SECTION- B

Answer any Four questions

4x5=20

7. Nursery pond
8. Turbidity
9. Fertilizer in culture pond
10. Algal bloom
11. Quarantine pond
12. Macrobrachium
13. White Spot Disease

P.R. GOVERNMENT COLLEGE (A), KAKINADA
CHOICEBASEDCREDIT SYSTEM
Four– year B.Sc. (Hons) Domain Subject: ZOOLOGY
Course 14 A: SUSTAINABLE AQUACULTURE MANAGEMENT
Question Bank for Sustainable Aquaculture Management

Module- I

1. Essay Questions
2. What is the current status of aquaculture at global and national level?
3. Describe Major Cultivable Freshwater fishes
4. Write an essay on Major cultivable species for brackish water
5. Write an essay on Design and Construction of Fish farm
6. Explain the Traditional, extensive, modified extensive, semi-intensive and intensive cultures of fish.
7. Explain the Traditional, extensive, modified extensive, semi-intensive and intensive cultures of shrimp.

Short Answer Questions

1. Any2 Brackish water food fishes
2. Any2 Marine food fishes
3. Criteria for selection of Fishes for cultivation
4. Extensive fish culture
5. Traditional fish culture

ModuleII

Essay Questions

1. What are the Physico-chemical conditions of soil and water required for aqua culture
2. What is the Functional Classification of Ponds in a fish farm
3. Need of fertilizer and manure application in culture ponds

Short Answer Questions

1. Nursery Pond
2. Turbidity
3. Fertilizer in Culture Pond
4. Quarantine Pond
5. Stocking pond
6. BOD
7. Nutrients

ModuleI III

Essay Questions

1. Write an essay on Induced Breeding
2. Culture of Indian Major carps- Pre- stocking
3. Culture of Indian major carps - Stocking management
4. Culture of Indian major carps - post-stocking management

Short Answer Questions

1. Algal Bloom
2. Liming
3. Stocking density
4. Predators
5. Oviposition

Module IV

Essay Questions

1. Explain the mixed culture of Fish and Prawn
 2. Commercial Importance of shrimp & prawn
 3. Macrobrachium rosenbergii- biology, seed production.
 4. Culture of L. vannamei – hatchery technology and culture practices
- #### Short Answer Questions
1. Vannamei
 2. Macrobrachium
 3. Larval Stages of Prawn
 4. Types of Hatcheries
 5. Eye stalk ablation

ModuleI V

Essay Questions

1. Explain the viral diseases in Fin Fish & shell fish
2. Explain the Bacterial Diseases in Prawns
3. Describe the Bacterial diseases of Fin fish
4. Explain the Fungal Diseases of Fish
5. Fungal diseases of Fin & Shell fish
6. Prophylaxis in aquaculture

Short answers

1. Any two viral diseases in Prawns
2. Any two bacterial diseases in fish
3. White spot disease
4. Dropsy
5. Prophylaxis

P.R. GOVERNMENT COLLEGE (A), KAKINADA CHOICE
BASED CREDIT SYSTEM
Four– year B.Sc. (Hons) Domain Subject: ZOOLOGY
Course 14 A: SUSTAINABLE AQUACULTURE MANAGEMENT
PRACTICAL SYLLABUS

Learning Outcomes:

On successful completion of this practical course, student shall be able to:

Identify the characters of Freshwater cultivable species

Estimate physico chemical characteristics of water used for aquaculture

Examine the diseases of fin and shellfish

Suggest measures to prevent diseases in aquaculture

Practical (Laboratory) Syllabus: (30hrs) (Max.50Marks)

1. Fresh water Cultivable species any (Fin& Shell Fish Specimens – Observation of morphological characters by observation and drawings)- Any three
2. Brackish water cultivable species (Fin &Shellfish-Specimens-Observation of Morphological Character by observing drawing) - - - Any three
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 pathological slides/Charts/ Models of viral pathogens in fin/ shell fish) ANY THREE
6. Bacterial diseases of Fin &Shell Fish (Observation of histopathological slides/ Charts/Models - ANYTHREE
7. Fungal diseases of Fin & Shell Fish (Observation of histo pathological slides/Charts/ Models of Bacterial pathogens in fin/ shell fish) Any three

Lab References

Boyd CE1982. Water Quality Management for Pond Fish Culture. Elsevier Scientific Publishing Company

http://www.fao.org/fishery/docs/CDrom/FAO_Training/FAO_Training/General/x6708e/x6

http://aquaticcommons.org/1666/1/Better-Practice3_opt.pdf

<https://www.notesonzoology.com/india/fishery/fish-diseases-symptoms-andcontrol-fishery/871>

Webresourcessuggestedbytheteacherconcernedandthecollegelibrarianincludingreading material Co-CurricularActivities

Mandatory:(Student training by teacher in field skills: Total15hrs., Lab:10+field05)

For Teacher: Trainingofstudentsbytheteacherinlaboratory/fieldfor not less than 15 hours on Breeding- Induced breeding in carps -hatchery technology of L. Vennamai- Farming techniques- disease diagnostic techniques—concepts –Demonstration @ any aqua laboratory

For Student: Students shall (individually) visit a Hatchery/Farm/ Aqua diagnostic center andmakecarefulobservationsoftheprocessmethodandimplements-protocolsandreport on the same in 10 pages hand written Fieldwork/Project work Report.

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

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

(IE). Unit tests.

SuggestedCo-CurricularActivities

Preparation of Model/Charts of Cultivable species of finfish shellfish

PreparationofModel/ChartofIdealfishPond-withthestandardsprescribed.

Observation of aquaculture activities in the area (Observation of any activity related to aquaculture in the vicinity of the college/village)

Preparation of Model—charts of Fin/Shell fish Diseases with eco-friendly material.

Assignments Group discussion, Seminar, Quiz, Collection of Material, Videopreparation etc.,
Invited lect

P.R. GOVERNMENT COLLEGE (A), KAKINADA CHOICE
BASED CREDIT SYSTEM
Four– year B.Sc. (Hons) Domain Subject: ZOOLOGY
Course6A: SUSTAINABLE AQUACULTURE MANAGEMENT
PRACTICAL MODEL PAPER

Max.Marks50

Time:2Hours

I.Identify the following spotters/Charts/Photographs (6x5) -- - 30M

A Fresh water fishes

B Brackish water fish

C. Viral disease fish/prawn

D. Bacterial Disease fish/prawn

E. Marine Fish

F. Fungal Disease fish/prawn

Record	-	-----	05M
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Field note book/project work report		-----	10M
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Viva voce		-----	05M
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Total 50M

	PITHAPUR RAJAH'S GOVT. DEGREE COLLEGE (A) KAKINADA.	PROGRAM & SEMESTER B.SC. HONOURS IN ZOOLOGY (MAJOR) SEMESTER-V			
COURSECODE: 15A	POST HARVEST TECHNOLOGY OF FISH AND FISHERIES				
THEORY	CREDITS:3	3 HRS/WEEK			
TEACHING	HOURS ALLOCATED:60(THEORY)	L	T	P	C
PRE- REQUISITES:	POST HARVEST TECHNOLOGY	4	0	2	4

HOURS:60

Max.Marks: 50

COURSE OUTCOMES

CO1: Explain the physiological and biochemical changes that occur in agricultural produce after harvest.

CO2: Identify and evaluate factors affecting postharvest losses in fruits, vegetables, grains, and other crops.

CO3: Demonstrate knowledge of postharvest handling, storage, and transportation methods to maintain quality and extend shelf life.

CO4: Apply appropriate preservation techniques such as refrigeration, drying, packaging, and controlled atmosphere storage.

CO5: Assess postharvest technologies and their role in ensuring food safety, quality, and marketability of produce.

CO6: Design and recommend postharvest management systems for different types of crops considering economic and environmental factors.

CO7: Interpret relevant national and international standards and regulations related to postharvest handling and quality assurance.

Learning objectives

Understand the Principles of Postharvest Physiology:

Explain the biological and chemical changes in crops after harvest.

Understand respiration, ripening, senescence, and spoilage processes.

Identify Postharvest Losses and Their Causes:

Analyze factors contributing to quantitative and qualitative postharvest losses.

Evaluate pre-harvest, harvest, and postharvest handling impacts.

Apply Methods for Postharvest Handling and Storage:

Select appropriate handling, packaging, and storage techniques for different crops.

Understand controlled and modified atmosphere storage principles.

Understand Postharvest Treatments and Technologies:

Identify technologies such as refrigeration, drying, curing, irradiation, and chemical treatments.

Evaluate the effectiveness and suitability of these technologies.

Design and Assess Postharvest Systems:

Develop systems to minimize loss and maintain quality from farm to consumer.

Apply HACCP and other quality control systems in postharvest management.

Evaluate Packaging Materials and Techniques:

Understand the role of packaging in extending shelf life and maintaining product quality.

Select suitable packaging based on commodity characteristics.

Promote Food Safety and Quality Standards:

Understand national and international food safety regulations.

Apply best practices to ensure food quality and safety during postharvest handling.

SYLLABUS

Unit – I Handling and Principles of fish Preservation

1.1 Handling of fresh fish, storage and transport of fresh fish, post mortem changes (rigor mortis and spoilage), spoilage in marine fish and freshwater fish.

1.2 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.

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above

Unit – II Methods of fish Preservation

2.1 Traditional methods - sun drying, salt curing, pickling and smoking.

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

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above

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

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

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

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above

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.

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above

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 National and International standards – ISO 9000: 2000 Series of Quality Assurance System, Codex Alimentarius.

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above

REFERENCES:

1. Santharam R, N Sukumaran and P Natarajan 1987. A manual of aquaculture, Oxford-IBH, NewDelhi
2. Lakshmi Prasad's, Fish Processing Technology 2012, Arjun Publishing House
3. Dr Sunitha Rai, Fish Processing Technology, 2015, Random Publications
4. Safety and Quality Issues in Fish Processing (Woodhead Publishing Series in Food Science, Technology and Nutrition) by H.A Bremner K.A Mahanthy, Innovations in Fishing and Fish Processing Technologies, January 2021

Web Resources

<http://ecoursesonline.iasri.res.in/mod/page/view.php?id=145743>

Co-Curricular Activities

Mandatory:

1. For Teacher: Training of students by the teacher in laboratory/field in 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 make observations 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 of place visited, observations made, findings and acknowledgements

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	1	2	2	1	2	2	3	2	3	2	2	2	2

CO2	2	1	2	2	1	1	2	3	1	2	2	2	2
CO3	1	1	2	3	2	1	1	2	2	2	1	2	1
CO4	2	2	1	2	1	2	2	2	2	2	2	2	2
CO5	2	2	1	1	1	2	2	1	1	1	1	1	2

P.R. GOVT. COLLEGE (AUTONOMOUS), KAKINADA

SEMESTER V

COURSE 15: POSTHARVEST TECHNOLOGY

BLUE PRINT FOR QUESTION PAPER SETTER

MODULE NO.	ESSAY QUESTIONS 10	SHORT ANSWER QUESTIONS 5	MARKS ALLOTTED TO THE UNIT
MODULE-1	1	2	20
MODULE-2	1	1	15
MODULE-3	2	2	30
MODULE-4	1	1	15
MODULE-5	1	1	15
TOTAL	06 OF WHICH 3 TO BE ANSWERED	07 OF WHICH 5 TO BE ANSWERED	95 MARKS INCLUDING CHOICE OF WHICH 50 MARKS TO BE

**PITHAPUR RAJA'S GOVT. COLLEGE (AUTONOMOUS),
KAKINADA
DEPARTMENT OF ZOOLOGY AND AQUACULTURE
COURSE: 15A
SEMESTER-V-POST HARVEST TECHNOLOGY OF FISH AND FISHERIES**

MODEL QUESTION PAPER

Time: 3 hrs.

Max Marks: 50

SECTION –A

Answer Any THREE of the following by choosing at least one question in each section (Draw labelled diagrams wherever necessary) 3X10=30

PART- I

S.No	Questions	BT Level	CO	PO	Marks
1	Describe storage and transport of fresh fish,	BT1	1	2	10
2	Discuss any four advanced methods of fish preservation	BT2	2	0	10
3.	Explain various Fish Products and their applications	BT2	2	0	10

S. No	Questions	BT Level	CO	PO	Marks
4	Write the Industrial Importance of Fish By-Products	BT1	1	2	10

5	Discuss on Environmental and personal hygiene in fish processing plants	BT2	2	2	10
6	Write about Seafood Quality Assurance System Ensuring Safety Standards	BT2	1	2	10

SECTION - B

Answer any FOUR of the following: Draw labeled diagrams wherever necessary

4x5=20 M

S. No	QUESTION	BT LEVEL	CO	PO	MARKS
7	Comment on rigormortis	BT1	2	1	05
8	Explain Advanced freeze drying	BT1	0	1	05
9	Role of Gamma rays	BT2	1	2	05
10	Fish oils	BT3	2	2	05
11	HACCP	BT1	2	1	05
12	GMP	BT1	0	1	05

13	ISO certification	BT2	1	2	01
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P.R. GOVT. COLLEGE (AUTONOMOUS),
KAKINADA
SEMESTER-IV
POSTHARVEST TECHNOLOGY OF FISH AND FISHERIES PAPER:
15A - QUESTION BANK

ESSAY QUESTIONS

1. Describe storage and transport of fresh fish BT1
2. Write an essay on traditional methods of fish preservation? - BT2
3. Discuss on spoilage in marine and freshwater fish.? BT1
4. Describe the principles of fish preservation. –BT1
5. Write About Traditional Methods of Fish Preservation. -BT1
6. Discuss the role of modern methods fish preservation. - BT2
7. Discuss the various types of fish products derived from fish and their importance in the food industry. - BT1
8. Explain any our fish by-products and their significance industry- .BT2
9. Describe the nutritional and economic value of fish protein concentrate, fish meal, and fish oil.
10. Discuss the importance of environmental hygiene in fish processing plants. BT1
11. Explain the role of personal hygiene in ensuring the safety and quality of fish and fishery products. Include examples of personal hygiene practices.BT2
12. Explain the importance of Good Manufacturing Practices (GMPs), Good Laboratory Practices (GLPs), BT1.
13. Discuss the concept of Hazard Analysis and Critical Control Points (HACCP) in the seafood industry. –BT1
14. Evaluate the challenges and advantages in adopting international standards such as ISO 9000 and Codex Alimentarius in sea food industry-BT4

SHORT ANSWER QUESTIONS:

1. Salting, 2.
Drying,
3. Chilling- BT1
4. 4 Rigor Mortis - BT2
5. Smoking
6. Canning
7. AFD
8. RSW
9. Fish minced meat
10. Chitosan
11. Fish meal
12. Isin glass
13. Fish leather
14. Fish manure
15. Fish ensilage
16. Environmental Hygiene
17. Personal Hygiene

- 18. GMP
- 19. GLP
- 20. Codex Alimentarius
- 21. Iso certification

SEMESTER-V

COURSE – 15 - POSTHARVEST TECHNOLOGY OF FISH AND FISHERIES

PRACTICALS 2 HRS/WEEK

LEARNING OUTCOMES:

On successful completion of this practical course, student shall be able to:

- Identify the quality of aqua processed products.
- Determine the quality of fishery by products by observation
- Analyze the protocols of aqua processing methods

SYLLABUS:

1. Evaluation of fish/ fishery products for organoleptic, chemical and microbial quality.
 2. Preparation of dried, cured and fermented fish products
 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 worksheet
 7. Corrective action procedures in processing of fish- flow chart- work sheet preparation (*Refer the following web sites for complete procedure method and estimations of above listed practical's)
- REFERENCES: 1. Dr Sunitha Rai, Fish Processing Technology, 2015, Random Publications

https://ecourses.icar.gov.in/e-Learningdownload3_new.aspx?Degree_Id=03.

https://krishi.icar.gov.in/jspui/bitstream/123456789/20770/1/Training%20Manual_Hygienic%20drying%20and%20packing%20of%20fish.pdf

PR GOVT COLLEGE
AUTONOMOUS KAKINADA
MAJOR ZOOLOGY
PAPER -15
POSTHARVEST TECHNOLOGY

PRACTICAL MODEL QUESTION PAPER - MAX MARKS-50

Part A — Major Experiments (30 Marks)

Answer the following

- I. Evaluate the given fish/fishery product for ($2 \times 15 = 30$ marks)
 - a) Organoleptic quality of Fish (OR)
 - b) Chemical Evaluation for Freshness of fish

- II. Prepare a dried, cured, or fermented fish product and
 - a) Record the process in a flow chart (OR)
 - b) Examine salt, protein, and moisture content in the final product

Part B

II. Answer the following: ($2 \times 5 = 10$ marks)

- a. Examine the spoilage in a given dried/cured fish product, marinade, or fish pickle. Record signs of spoilage and probable causes

- b. Prepare a hazard analysis worksheet for a fish processing operation (drying, curing, or fermentation)

Viva Voce (5 Marks)

Record

TOTAL- 50 MARKS

ENVIRONMENTAL EDUCATION

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

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

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

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

Unit 1: Environment and Natural Resources

06 Hrs.

1. Multidisciplinary nature of environmental education; scope and importance.
2. Man as an integral product and part of the Nature.
3. A brief account of land, forest and water resources in India and their importance.

4. Biodiversity : Definition; importance of Biodiversity - ecological,consumptive, productive, social, ethical and moral, aesthetic, and option value.
5. Levels of Biodiversity: genetic, species and ecosystem diversity.

Unit-2: Environmental degradation and impacts 10Hrs

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

Unit 3: Conservation of Environment

10 Hrs

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

Suggested activities to learner: (4 hours)

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

Suggested text book :

- ErachBarucha (2004) *Text book of Environmental Studies for Undergraduate courses* (Prepared for University Grants Commission) Universities Press.
- PurnimaSmarath (2018) *Environmental studies* Kalyani Publishers, Ludhiana

Reference books :

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

ENVIRONMENTAL EDUCATION

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

Time: 2 Hours

Maximum Marks: 50

Section–A

I. Answer any THREE questions. Choosing at least 1 question from each part

$3 \times 10 = 30$ Marks

PART I

1. Define Biodiversity. Explain its importance and conservation strategies
2. Explain the reasons and effects of Deforestation.
3. Write an essay on sustainable development.

PART II

4. Describe Land **and Water Resources** in India
5. Discuss **Global Warming** and its impacts.
6. Explain International agreements for environmental protection

Section–B

II. Answer any Four questions.

$4 \times 5 = 20$ Marks

7. Forest resources
8. Ecosystem Diversity
9. Nonrenewable energy
10. Ozone layer depletion
11. Air pollution
12. Habitat destruction
13. Environmental protection Act

DEPARTMENT OF ZOOLOGY

LIST OF EXAMINERS

S. No	Name of the Examiners	Subject	Name of the College
1.	Dr.N. Sreenivas	Zoology	GDCRamachandrapuram
2.	B. AhmadAliBaba	Zoology	GDC Pithapuram
3.	Dr. PJohnKiran	Zoology	GDC, Nakkapalli
4.	Dr.M. Vijaya Kumar	Zoology	SRRGDCVijayawada
5.	Dr.P. JayaBharathi	Zoology	VSK College, Vizag
6.	N. Suneetha	Zoology	SRR GDC, Vijayawada
7.	V.Sandhya	Zoology	GDC, Kaikaluru
8.	Dr. R. P Dattu	Zoology	GDC, Tiruvuru.
9.	Dr. K. RamaRao	Zoology	VSK College, Vizag
10.	Dr.T. Samuel DavidRaj	Zoology	GDC, Porumamilla
11.	Dr. P.R Vani	Zoology	VSK College, Vizag
12.	DrY.PoliNaidu	Zoology	GDC, Srikakulam
13.	A. Arjuna Apparao	Zoology	GDC, Yellamanchili
14.	Dr. D. Sailaja	Zoology	GDC, rajamahendravaram
15.	P.S.C.H.P Deepika Rani	Zoology	SKR College(W), Rajahmundry
16.	DrG.VijayPrathap	Zoology	VSK College, Vizag
17.	Dr.Y. Shantiprabha	Zoology	VSK College, Vizag
18.	M. Vasantha Lakshmi	Zoology	ASD GDC (W), A, Kakinada



Lecturer in charge
Dept of Zoology & Aquaculture

DEPARTMENT OF ZOOLOGY

LIST OF QUESTION PAPER SETTERS

S. No	Name of the QP setter	Subject	Name of the College
1.	Dr.N. Sreenivas	Zoology	GDC Ramachandrapuram
2.	B. Ahmad Ali Baba	Zoology	GDC Pithapuram
3.	Dr. P John Kiran	Zoology	GDC, Nakkapalli
4.	Dr.M. Vijaya Kumar	Zoology	SRRGDC Vijayawada
5.	Dr.P. Jaya Bharathi	Zoology	VSK College, Vizag
6.	N. Suneetha	Zoology	SRR GDC, Vijayawada
7.	V.Sandhya	Zoology	GDC, Kaikaluru
8.	Dr. R.P Dattu	Zoology	GDC, Tiruvuru.
9.	Dr. K. Rama Rao	Zoology	VSK College, Vizag
10.	Dr.T. Samuel David Raj	Zoology	GDC, Porumamilla
11.	Dr. P.R Vani	Zoology	VSK College, Vizag
12.	Dr Y.Poli Naidu	Zoology	GDC, Srikakulam
13.	A. Arjuna Apparao	Zoology	GDC, Yellamanchili
14.	Dr. D. Sailaja	Zoology	GDC, Rajamahendravaram
15.	P.S.C.H.P Deepika Rani	Zoology	SKR College(W), Rajahmundry
16.	Dr G.Vijay Prathap	Zoology	VSK College, Vizag
17.	Dr.Y. Shantiprabha	Zoology	VSK College, Vizag
18.	Sri.D. Durgarao	Zoology	GDC (A), Rajahmundry



Lecturer in charge
Dept of Zoology & Aquaculture

