Smt.N.P.Savithramma
Govt college for women

Re-accredited in cycle 3 with A Grade by NAAC
Chittoor-517002

DEPARTMENT OF ZOOLOGY

BoS 2025-2026

DEPARTMENT OF ZOOLOGY

BOARD OF STUDIES

2025-2026

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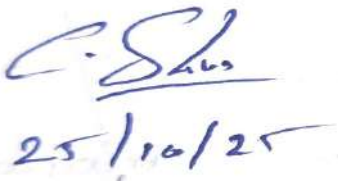
Smt.N.P.Savithramma Govt.Degree College for Women, (A), Chittoor

Department of Zoology

The Board of Studies meeting in Zoology for the academic year 2025–26 was conducted in the Department of Zoology on 25-10-2025 at 11:00 A.M., with Sri K. Nagaraju, Lecturer in Zoology, in the chair, along with the following members.

S.No.	Name, Designation and Address	Chairman/ Member & Category	Signature of the Members
1.	Sri.K.Nagraju, HOD, Dept of Zoology, Smt.N.P.Savithramma Govt.Degree College for Women, (A), Chittoor koppunagarajumail@gmail.com 9493441321	Chairperson (In-charge of the Department)	
2.	Smt.C.Komala Devi, Lecturer in Zoology, Smt.N.P.Savithramma Govt.Degree College for Women, (A), Chittoor	Member of the Department	
3.	Dr.C.Venkatakrishnaiah, M.Sc,Ph.D Lecturer in Zoology Govt.Degree College, Puttur, Tirupati Dist. drcvkrishna@gmail.com 9866212456	University Nominee (One expert to be nominated by Vice-Chancellor from panel of six recommended by the Principal)	

4.	Dr.D.Veera Nagendra Kumar, M.Sc,M.A,B.Ed,Ph.D Lecturer in Zoology Government College for Men (A), Kadapa, YSR Kadapa Dist. veeranagendrakumar@gmail.com 9492657661	Subject experts (Two experts in the subject from outside the college to be nominated by the Academic Council)	
5.	Dr.K.R.Shanmugam MSc, PhD Associate Professor PRR&VS Government Degree College Vidavaluru krshanmugamphd@gmail.com 9440079415		
6.	C Siva, B.com, LLB. Proprietor of Eeshan silks, Chittoor, Shiva.bjc@gmail.com 9786308628	Industry Representative	
7.	Dr.D.Saritha M.sc,B.Ed,Ph.D 2009-smt NPS GDC Chittoor PhD SV University Zoology Guest faculty PVKN GDC Chittoor sarithadharmaraj16@gmail.com 9182162176	Student Representative	

AGENDA

1.Update/Revise/Modify the **UG (B.Sc. Zoology Honours) I Semester Course-1**, entitled *Animal Diversity–I: Biology of Non-Chordates* (Syllabus, Model Question Paper, and Blueprint).

2.Update/Revise/Modify the **UG (B.Sc. Zoology Honours) I Semester Course-2**, entitled *Animal Diversity–II: Biology of Chordates* (Syllabus, Model Question Paper, and Blueprint).

3. Update/Revise/Modify the **UG (B.Sc. Zoology Honours) II Semester Course-3**, entitled *Cell and Molecular Biology* (Syllabus, Model Question Paper, and Blueprint).

4. Update/Revise/Modify the **UG (B.Sc. Zoology Honours) I Semester Course-4**, entitled *Embryology* (Syllabus, Model Question Paper, and Blueprint).

5.Discussion and approval of the **Certificate Course** on *Introduction to Medical Lab Techniques*.

6.Discussion and approval of the **Scheme and Syllabus** for **Value Added Courses on Environmental Biology**

7.Discussion and approval of the **External and Internal Scheme of Examination** for B.Sc. Zoology (Honours) I Semester.

8.Approval of the **Panel of Question Paper Setters and Examiners** for B.Sc. Zoology (Honours).

9.Approval of the **Methodology for Innovative Teaching and Evaluation** under CBCS for B.Sc. Zoology (Honours).

10.Consideration and approval of **Proposals for Industrial and Field-based Student Study Projects, Study Tours, and Area Study Programmes** for the academic year 2025–2026.

11.Consideration and approval of **Proposals for Organizing Seminars, Conferences, Workshops, and Research Projects** under the autonomous grant for the academic year 2025–2026.

12.Consideration and approval of **Proposals for Community-based Extension Activities, Student and Faculty Exchange Programmes, and other Academic and Extra-curricular Activities** of the Department for the academic year 2025–2026.

13.Discussion and approval of **Suggestions regarding Evaluation and Assessment Patterns** for B.Sc. Zoology (Honours).

14.Any other proposals with the **permission of the Chair**.

B.Sc. Zoology (Honours)
I Year, I Semester and II Semester– Course Structure

Year	Semester	Paper/ Course	Subject title	Paper code	Hrs/ Weeks	Credits	IA	EA	Total
I	I	1	Animal Diversity-I Biology of Non-Chordates	25ZOO101T	3	3	30	70	100
		1	Animal Diversity-I Biology of Non-Chordates Practical	25ZOO101P	2	1		50	50
		2	Animal Diversity-II Biology of Chordates	25ZOO102T	3	3	30	70	100
		2	Animal Diversity-II Biology of Chordates Practical	25ZOO102P	2	1		50	50
	II	3	Cell and Molecular Biology	25ZOO203T	3	3	30	70	100
		3	Cell and Molecular Biology Practical	25ZOO203P	2	1		50	50
		4	Embryology	25ZOO204T	3	3	30	70	100
		4	Embryology Practical	25ZOO204P	2	1		50	50

Zoology – Blueprint for External Question Papers (Theory), I and II Semester

S.NO.	Type of Questions	No.of Questions given	No.of Questions To be answered	Marks allotted to each question	Total Marks
1.	PART-A: Short Answer Questions	10	5	4	20
2.	PART-B: Long Answer Questions	10	5	10	50
				TOTAL	70

Zoology – Blueprint for Internal Question Papers (Theory), I and II Semester

S.NO.	Type of Questions	No.of Questions given	No.of Questions To be answered	Marks allotted to each question	Total Marks
1.	PART-A: Short Answer Questions	3	2	5	10
2.	PART-B: Long Answer Questions	2	1	10	10
				TOTAL	20

Zoology – Blueprint for Internal Question Papers (Theory), I and II Semester

S.No	Type Of Assessment	Weightage of Marks
1	Project Work	05
2	Seminar/Quiz/Presentation	05
3	Assignments	05
4	Extra Curricular Activties like Claning & Greening, NSS & YRC	05
4	Testing of Knowlegde through Mid Term-Exam I & II	40(20+20)
	Total	**60**

Note:

1.The internal assessment for **B.Sc. Zoology (Honours), I Semester & II Semester (Theory)** will be conducted for a total of **60 marks**, which will subsequently be **reduced to 30 marks** for the final computation of results.

2. No internal assessment will be conducted for Practical papers.

Design &Blueprint

Distribution of marks as per learning objectives

S.NO.	Learning Objective	%	Marks
1.	Knowledge/Recall	30%	21
2.	Understanding	30%	21
3.	Application	20%	14
4.	Skill	20%	14

Distribution as per question type

S.NO.	Question Type	%	Marks
1.	Short Answer Questions	30%	20
2.	Long Answer Questions	70%	50

Distribution of marks as per difficulty level

Easy	Average	Difficult	Total
20	30	20	70

Programme Outcomes (POs)

Programme Outcomes (POs) describe the broad set of skills, abilities, and attributes that students are expected to achieve upon the successful completion of the B.Sc. Zoology programme. These outcomes reflect the overall goals of higher education in developing scientific knowledge, analytical thinking, ethical awareness, communication, and lifelong learning abilities. Each course in the programme contributes to these outcomes at varying levels through its specific objectives, teaching methods, and assessment strategies.

PO 1: Knowledge Acquisition: Develop a comprehensive understanding of the fundamental and advanced concepts in Zoology, including animal diversity, physiology, genetics, evolution, ecology, and applied biology.

PO 2: Critical Thinking and Scientific Reasoning: Enhance analytical thinking and logical reasoning to identify, interpret, and solve biological problems using scientific principles and experimental evidence.

PO 3: Research Aptitude: Develop the ability to design, conduct, and interpret biological experiments, analyze data statistically, and draw valid conclusions through scientific investigation.

PO 4: Communication Skills:Acquire effective oral and written communication skills for presenting scientific ideas, research findings, and reports clearly and logically.

PO 5: Ethical Awareness:Understand and apply ethical principles in scientific research, animal experimentation, and environmental conservation, ensuring responsible conduct.

PO 6: Problem-Solving and Application:Apply zoological knowledge to address practical problems in agriculture, aquaculture, animal husbandry, pest control, and human health.

PO 7: Teamwork and Leadership:Develop collaborative and leadership skills to work efficiently in multidisciplinary teams for fieldwork, research projects, and community-based studies.

PO 8: Environmental and Social Awareness:Recognize the importance of biodiversity conservation and understand the role of humans in maintaining ecological balance and sustainability.

PO 9: Digital Competence:Use digital tools, data analysis software, and online resources effectively for academic learning, research, and dissemination of biological information.

PO 10: Lifelong Learning:Cultivate curiosity and motivation for continuous learning, adapting to new scientific developments and emerging trends in the biological sciences.

Programme Specific Outcomes (PSOs)

Programme Specific Outcomes (PSOs) represent the discipline-focused competencies that students acquire through the study of Zoology. They emphasize the integration of theoretical knowledge with laboratory and field experience, fostering understanding of animal biology, evolution, physiology, ecology, genetics, and applied zoology. The PSOs aim to prepare students with scientific reasoning, research aptitude, ethical responsibility, and practical skills relevant to both academic and professional careers in the life sciences.

PSO 1: Understanding Animal Diversity:Identify, classify, and compare various animal groups based on their structural, functional, and evolutionary characteristics.

PSO 2: Functional Biology and Physiology:Explain the physiological mechanisms regulating animal life processes such as respiration, digestion, excretion, reproduction, and neural coordination.

PSO 3: Genetics and Molecular Biology:Understand the molecular basis of inheritance, gene expression, mutations, and genetic disorders, and apply this knowledge to modern biotechnology.

PSO 4: Ecology and Environmental Biology:Analyze ecological interactions, population dynamics, and environmental issues, promoting biodiversity conservation and sustainable resource use.

PSO 5: Developmental and Evolutionary Biology:Describe patterns and processes of animal development and evolution, and appreciate the genetic and molecular mechanisms underlying them.

PSO 6: Applied Zoology:Apply zoological knowledge in fields such as apiculture, aquaculture, sericulture, poultry, and pest management to enhance livelihood and industry.

PSO 7: Laboratory and Field Skills:Develop practical skills in microscopy, dissection, biochemical testing, specimen preservation, and ecological sampling with safety and accuracy.

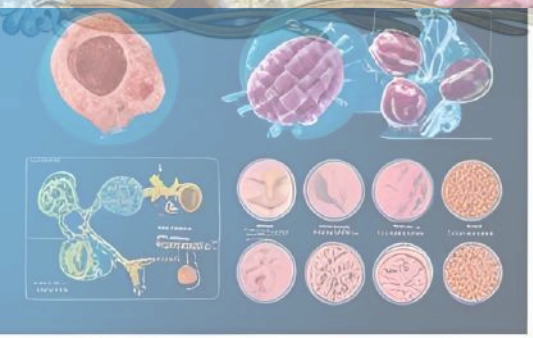
PSO 8: Research and Data Interpretation:Design simple experiments, collect biological data, and use statistical and computational tools to analyze and interpret results effectively.

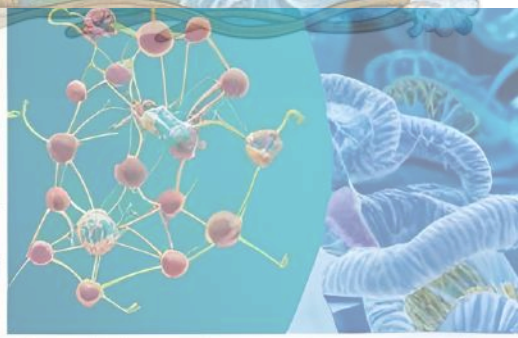
PSO 9: Bioethics and Conservation Values:Demonstrate ethical behavior in handling animals and natural resources, emphasizing animal welfare and conservation of biodiversity.

PSO 10: Career and Higher Education Readiness:Equip students with scientific knowledge and analytical abilities for pursuing higher education, research, and diverse careers in life sciences.

DEPT OF ZOOLOGY

SEMESTER I





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

Theory Credits: 3 3 hrs/week

COURSE OBJECTIVES:

- To understand the taxonomic position of protozoa to helminthes.
- To understand the general characteristics of animals belonging to Protozoa to Hemichordate.
- To understand the structural organization of 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 & Nemathelminthes using examples, parasitic adaptation
- Describe Phylum Annelida & Arthropoda using examples and economic importance of vermicomposting & economic importance of insects.
- Describe Mollusca, Echinodermata & Hemichordata with suitable examples in relation to the phylogeny

SYLLABUS:

UNIT-I

1.1 Whittakers 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

3.3Nemathelminthes 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

4.3Arthropoda 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.

Smt.N.P.Savithramma Govt.Degree College for Women,(A),Chittoor

Chittoor District-517002

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

Semester –I Syllabus for 2025-26

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

Theory Paper code: 25ZOO101T Credits: 3 3hrs/week

COURSE OBJECTIVES:

- To understand the taxonomic position of protozoa to helminthes.
- To understand the general characteristics of animals belonging to Protozoa to Hemichordate.
- To understand the structural organization of 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:

After successful completion of this course, the student will be able to:

CO 1: Define and **explain** the fundamental principles of *Whittaker's five kingdom classification* and the major *phyla of non-chordates* based on structural and functional organization.
(Knowledge, Understanding)

CO 2: Identify and **classify** various non-chordate animals from Protozoa to Hemichordata up to class level with suitable examples.
(Knowledge, Application)

CO 3: Describe the morphology, anatomy, and life processes such as *locomotion, nutrition, and reproduction* in Protozoa, Porifera, Coelenterata, and other phyla.
(Understanding)

CO 4: Illustrate and compare different *systems and adaptations* such as canal systems in sponges, polymorphism in coelenterates, parasitic adaptations in helminths, and affinities of Peripatus and Balanoglossus.
(Application, Analysis)

CO 5: Explain and evaluate the *life cycles and pathogenicity* of representative parasites such as *Ascaris lumbricoides* and their effects on human health.
(Understanding, Evaluation)

CO 6: Discuss the *economic importance* of non-chordates such as earthworms in vermicomposting and molluscs in pearl formation, emphasizing their applied value. *(Understanding, Application)*

CO 7: Develop skills in *observation, data collection, presentation, and peer communication* through assignments, seminars, quizzes, and project-based activities. *(Application, Communication, Evaluation)*

CO 8: Interpret the *evolutionary relationships* and *affinities* among lower non-chordate groups using morphological and anatomical evidences. *(Analysis, Evaluation)*

COs and POs MAPPING

index	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	Average
CO1	3.0	2.0	-	-	-	-	-	-	-	-	**2.5**
CO2	3.0	3.0	3.0	-	-	3.0	-	-	3.0	-	**3.0**
CO3	2.0	3.0	3.0	-	2.0	3.0	-	2.0	-	-	**2.5**
CO4	3.0	4.0	4.0	-	3.0	4.0	-	3.0	-	-	**3.5**
CO5	3.0	3.0	4.0	-	4.0	4.0	-	3.0	3.0	-	**3.43**
CO6	2.0	3.0	3.0	-	4.0	5.0	-	4.0	3.0	-	**3.43**
CO7	-	4.0	4.0	5.0	3.0	3.0	4.0	-	4.0	3.0	**3.75**
CO8	3.0	4.0	4.0	4.0	3.0	3.0	-	4.0	3.0	4.0	**3.56**
Average	**2.71**	**3.25**	**3.57**	**4.5**	**3.17**	**3.57**	**4.0**	**3.2**	**3.2**	**3.5**	**3.21**

COs and PSOs MAPPING

index	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	Average
CO1	4.0	-	-	-	3.0	-	-	-	-	-	**3.5**
CO2	4.0	3.0	-	-	-	-	-	-	-	-	**3.5**
CO3	3.0	4.0	-	3.0	-	-	-	-	-	-	**3.33**
CO4	4.0	4.0	-	4.0	3.0	-	-	-	3.0	-	**3.6**
CO5	-	3.0	4.0	4.0	4.0	-	-	-	4.0	-	**3.8**
CO6	-	3.0	-	3.0	-	5.0	-	-	4.0	-	**3.75**
CO7	-	-	-	-	-	-	4.0	-	-	4.0	**4.0**
CO8	4.0	-	-	4.0	-	-	-	4.0	4.0	-	**4.0**
Average	**3.8**	**3.4**	**4.0**	**3.6**	**3.33**	**5.0**	**4.0**	**4.0**	**3.75**	**4.0**	**3.68**

The CO–PO and CO–PSO mapping analyses collectively demonstrate that the course provides a well-balanced blend of **knowledge, comprehension, application, and analytical learning** as outlined in Bloom's taxonomy. The mappings confirm that the course outcomes (COs) are effectively aligned with both **broad programme objectives (POs)** and **discipline-specific**

competencies (PSOs). Students not only acquire fundamental and advanced zoological knowledge but also develop critical thinking, experimental skills, ethical awareness, and environmental consciousness. The average values across both tables indicate that the course design ensures progressive learning — from conceptual understanding to analytical problem-solving and applied zoological practice — thereby fulfilling the holistic educational goals of the Zoology programme.

In the tables, the **numerical values (1–5)** represent the **level of relationship or strength** of contribution between a Course Outcome (CO) and a Programme Outcome (PO) or Programme Specific Outcome (PSO).

- **Higher averages (≈ 4 – 5)** → indicate a **strong or very strong alignment**
  → meaning that the course outcomes contribute substantially to achieving that PO or PSO.
- **Moderate averages (≈ 2 – 3)** → indicate a **medium contribution**,
  → meaning the CO supports that outcome but not at an advanced level.
- **Lower averages (≈ 1 – 2)** → indicate a **weak or minimal linkage**,
  → meaning the CO only indirectly supports that PO/PSO.

SYLLABUS:

UNIT-I

1.1 **Importance of Classification and Modern Trends in Animal Classification (Addition)**, Whittakers 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 , Parasitic Protozoans **(Addition)**,

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, **Role of Sponges in Biotechnology / Marine Biotechnology & Ecological Services (Addition)**

2.3 Coelenterata General characters and classification up to classes with suitable examples

2.4 Polymorphism in coelenterates & Corals and coral reefs, **Role of Corals in Biotechnology / Marine Biotechnology & Ecological Services (Addition)**

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** (DEL), **Host-parasite interactions and immunological responses in helminth infections (Addition)**

3.3Nemathelminthes 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

4.3Arthropoda General characters and classification up to classes with suitable examples, **Economic importance of Insects (Addition)**

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 **Economic importance of Molluscans (Addition)**, 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.

ZOOLOGY MAJOR BLUE PRINT FOR QUESTION PAPERS
PROGRAMME: B. Sc Honours in ZOOLOGY (MAJOR)

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

(FOR I YEAR- THEORY PAPER)

Time: 3hours **Max marks: 70**

S.NO	Type of Questions	No. of Questions Given	No. of Questions To be answered	Marks allotted to each question	Total Marks
1	PART-I: Short Answer Questions	10	05	04	**20**
2	PART-II: Essay Answer Questions	10	05	10	**50**
				TOTAL	**70**

Note:A total of 10 short answer questions will be given — 2 questions from each unit. There will be no alternative questions.Students may answer any five questions of their choice. A total of **10 essay-type questions** will be given — **2 questions from each unit**, with **one alternative choice** per unit.Students must **answer one question from each unit**

Smt.N.P.Savithramma Govt.Degree College for Women,(A),Chittoor

Chittoor District-517002

PROGRAMME – ZOOLOGY MAJOR

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

BLUE PRINT

UNIT	SHORT ANSWER QUESTIONS	LONG ANSWER QUESTIONS
I	2	2
II	2	2
III	2	2
IV	2	2
V	2	2
Total	10	10

Smt.N.P.Savithramma Govt.Degree College for Women,(A),Chittoor

Chittoor District-517002

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

Model Question Paper

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

Paper code: 25ZOO101T Time:3hr Marks:70

I. Answer any "Five" of the following questions: 5X4=20

1. Mention the General Characters of Protozoa.
2. Describe the **types of locomotion in Protozoa** with suitable examples.
3. Write a short note on the **canal system in sponges.**
4. Explain different types of coral reefs**.**
5. Write short notes on the **parasitic adaptations in helminths.**
6. Mention the **general characters of Nemathelminthes**.
7. Classification of Annelida up to classes with suitable examples**.**
8. Write a note on the **economic importance of vermicompost.**
9. Explain the **process of pearl formation in Pelecypoda.**
10. Write short notes on the **classification of Echinodermata.**

II. Answer any "FIVE" of the following questions: 5X10=50

11. Explain about Whittaker five kingdom classification if Animal kingdom?

(Or)

Write in detail about the reproduction in Protozoa.

12. Write about the general characters of Porifera and classification upto classes with examples

(Or)

Explain about the Polymorphism in Coelenterata.

13. Write about the general characters of Platyhelminthes & classification upto classes with examples.

(Or)

Explain in detail about the life cycle of Fasciola hepatica?

14. Explain about the processing of Vermicompost?

(Or)

Write about the structure and affinities of Peripatus?

15. Explain about the water vascular system in Asterias?

(Or)

Write about the structure and affinities of Balanoglossus.

APSCHE

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, Pennatula

5. Platyhelminthes: Planaria, Fasciola hepatica, Fasciola larval forms – Miracidium, Redia, Cercaria, Echinococcus granulosus, Taenia solium, Schistosoma haematobium

6. Nemathelminths: 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

RFERENCE WEB LINKS:

- https://virtualmicroscopy.peabody.yale.edu/
- https://tnhm.in/category/assorted-gallery-for-vertebrates-and-invetebrates/invertebrates/
- http://www.nhc.ed.ac.uk/index.php?page=24.25.312
- https://biologyjunction.com/invertebrate-notes/
- https://lawebs.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

Smt.N.P.Savithramma Govt.Degree College for Women, (A), Chittoor

Chittoor District-517002

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

Semester –I Syllabus for 2025-26

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

Practical:25ZOO101P 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, Pennatula

5. Platyhelminthes: Planaria, Fasciola hepatica, Fasciola larval forms – Miracidium, Redia, Cercaria, Echinococcus granulosus, Taenia solium, Schistosoma haematobium

6. Nemathelminths: 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

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- https://tnhm.in/category/assorted-gallery-for-vertebrates-and-invetebrates/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

Smt.N.P.Savithramma Govt.Degree College for Women,(A),Chittoor

Chittoor District-517002

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

Practical-Model Question Paper

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

Subject code: 25ZOO1O1P **Time:3hr** **Marks:50**

S.No	Questions	Marks
1	Draw a Labeled diagram of virtual dissection/ dissected animals of -- -- -- -- -- -- --	1X15 = 15M
2	Identification of Five spotters/ models/ Slides/ photographs, draw a labeled neat diagram with salient features Note: One from each unit	5 x 5 = 25 M
3	Record (5M)+ Viva voce (5 M)	10M
	Total	50M

APSCHE

SEMESTER-I COURSE 2: ANIMAL DIVERISTY-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

1.2 Salient features of Cephalochordata, Salient features of Urochordata

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

1.4 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 teaching/Report writing after watching any video on the above Seminar/Quiz/Project/Peer

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.

Smt.N.P.Savithramma Govt.Degree College for Women,(A),Chittoor

Chittoor District-517002

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

Semester –I Syllabus for 2025-26

SEMESTER-I COURSE 2: ANIMAL DIVERISTY-II BIOLOGY OF CHORDATES

Theory	Paper code:25ZOO102T	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 –

CO 1: Define and explain the fundamental principles of chordate classification and the major subphyla and classes based on structural and functional organization.
(Knowledge, Understanding)

CO 2: Identify and classify various chordate animals from Protochordates to Mammals up to class level with suitable examples.
(Knowledge, Application)

CO 3: Describe the morphology, anatomy, and physiological systems such as digestive, respiratory, circulatory, and nervous systems in representative chordates including Scoliodon, Rana, Calotes, Columba, and mammals.
(Understanding)

CO 4: Illustrate and compare structural features, adaptive modifications, and affinities among chordate groups such as Cephalochordata, Urochordata, Cyclostomata, Fishes, Amphibians, Reptiles, Aves, and Mammals.
(Application, Analysis)

CO 5: Explain and evaluate significant biological processes such as retrogressive metamorphosis in Herdmania, migration in fishes and birds, and flight adaptations in birds.
(Understanding, Evaluation)

CO 6: Discuss the comparative anatomy and evolutionary trends in chordate organ systems such as heart, brain, dentition, and reproductive adaptations.
(Understanding, Application)

CO 7: Develop skills in observation, specimen identification, model preparation, and communication through assignments, seminars, quizzes, and project-based activities.
(Application, Communication, Evaluation)

CO 8: Interpret the evolutionary relationships among different classes of chordates and their adaptive radiation in diverse ecological habitats.
(Analysis, Evaluation)

COs and POs MAPPING

index	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	Average
CO1	3.0	2.0	-	-	-	-	-	-	-	-	**2.5**
CO2	3.0	3.0	3.0	-	-	3.0	-	-	3.0	-	**3.0**
CO3	3.0	3.0	3.0	-	3.0	3.0	-	2.0	-	-	**2.83**
CO4	3.0	4.0	4.0	-	3.0	4.0	-	3.0	-	-	**3.5**
CO5	3.0	4.0	4.0	-	4.0	4.0	-	3.0	3.0	-	**3.57**
CO6	3.0	3.0	4.0	-	4.0	5.0	-	4.0	3.0	-	**3.71**
CO7	-	4.0	4.0	5.0	3.0	3.0	4.0	-	4.0	3.0	**3.75**
CO8	3.0	4.0	4.0	4.0	3.0	4.0	-	4.0	3.0	4.0	**3.67**
Average	**3.0**	**3.38**	**3.71**	**4.5**	**3.33**	**3.71**	**4.0**	**3.2**	**3.2**	**3.5**	**3.32**

COs and PSOs MAPPING

index	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	Average
CO1	4.0	-	-	-	3.0	-	-	-	-	-	**3.5**
CO2	4.0	3.0	-	-	-	-	-	-	-	-	**3.5**
CO3	3.0	4.0	-	3.0	-	-	-	-	-	-	**3.33**
CO4	4.0	4.0	-	4.0	3.0	-	-	-	3.0	-	**3.6**
CO5	-	3.0	4.0	4.0	4.0	-	-	-	4.0	-	**3.8**
CO6	-	3.0	-	3.0	-	5.0	-	-	4.0	-	**3.75**
CO7	-	-	-	-	-	-	4.0	-	-	4.0	**4.0**
CO8	4.0	-	-	4.0	-	-	-	4.0	4.0	-	**4.0**
Average	**3.8**	**3.4**	**4.0**	**3.6**	**3.33**	**5.0**	**4.0**	**4.0**	**3.75**	**4.0**	**3.68**

The CO–PO and CO–PSO mapping analyses collectively demonstrate that the course provides a well-balanced blend of **knowledge, comprehension, application, and analytical learning** as outlined in Bloom's taxonomy. The mappings confirm that the course outcomes (COs) are effectively aligned with both **broad programme objectives (POs)** and **discipline-specific**

competencies (PSOs). Students not only acquire fundamental and advanced zoological knowledge but also develop critical thinking, experimental skills, ethical awareness, and environmental consciousness. The average values across both tables indicate that the course design ensures progressive learning — from conceptual understanding to analytical problem-solving and applied zoological practice — thereby fulfilling the holistic educational goals of the Zoology programme.

In the tables, the **numerical values (1–5)** represent the **level of relationship or strength** of contribution between a Course Outcome (CO) and a Programme Outcome (PO) or Programme Specific Outcome (PSO).

- **Higher averages (≈ 4 – 5)** → indicate a **strong or very strong alignment**
  → meaning that the course outcomes contribute substantially to achieving that PO or PSO.
- **Moderate averages (≈ 2 – 3)** → indicate a **medium contribution**,
  → meaning the CO supports that outcome but not at an advanced level.
- **Lower averages (≈ 1 – 2)** → indicate a **weak or minimal linkage**,
  → meaning the CO only indirectly supports that PO/PSO.

SYLLABUS:

UNIT - I

1.1 General characters and classification of Chordata up to classes and **Evolutionary trends (Addition)**.

1.2 Salient features of Cephalochordata, Salient features of Urochordata

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

1.4 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, **Evolutionary trends in fishes (Addition)**.

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: causes, types, ecological and economic significance (Modified), Types of Scales

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

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 and classification (Addition) 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 (Deleted)

3.5 Identification of Poisonous Snakes, **Venom Types and Their Importance to Humans and Ecosystem (Addition)**

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: causes, types, ecological, conservation & economic significance **(Modified),** 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
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• 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.

B. Sc Honours in ZOOLOGY (MAJOR)

SEMESTER-I COURSE 2: ANIMAL DIVERISTY-II BIOLOGY OF CHORDATES

(FOR I YEAR- THEORY PAPER)

Time: 3hours **Max marks: 70**

S.NO	Type of Questions	No. of Questions Given	No. of Questions To be answered	Marks allotted to each question	Total Marks
1	PART-I: Short Answer Questions	10	05	04	**20**
2	PART-II: Essay Answer Questions	10	05	10	**50**
				TOTAL	**70**

Note:A total of 10 short answer questions will be given — 2 questions from each unit.

There will be no alternative questions.Students may answer any five questions of their choice.

A total of **10 essay-type questions** will be given — **2 questions from each unit**, with **one alternative choice** per unit.Students must **answer one question from each unit**

Smt.N.P.Savithramma Govt.Degree College for Women,(A),Chittoor

Chittoor District-517002

PROGRAMME – ZOOLOGY MAJOR

SEMESTER-I COURSE 2: ANIMAL DIVERISTY-II BIOLOGY OF CHORDATES

BLUE PRINT

UNIT	SHORT ANSWER QUESTIONS	LONG ANSWER QUESTIONS
I	2	2
II	2	2
III	2	2
IV	2	2
V	2	2
Total	10	10

Smt.N.P.Savithramma Govt.Degree College for Women,(A),Chittoor

Chittoor District-517002

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

Model Question Paper

SEMESTER-I COURSE 2: ANIMAL DIVERISTY-II BIOLOGY OF CHORDATES

Paper code: 25ZOO102T **Time:3hr** **Marks:70**

I. Answer any "Five" of the following questions: **5X4=20**

Each carries four marks only

1. Mention the **salient features of Cephalochordata** and give suitable examples.
2. Explain the **process and significance of retrogressive metamorphosis in Herdmania.**
3. Write short notes on the **salient features of Dipnoi (lung fishes).**
4. Describe the **structure and function of the brain in Scoliodon.**
5. Write short notes on the **respiratory system of Rana hexadactyla.**
6. Mention the **characteristic features used to identify poisonous snakes.**
7. Write a note on the **flight adaptations in birds.**
8. Describe the **structure the heart in Columba livia.**
9. Write short notes on the **classification of mammals up to subclasses with examples.**
10. Explain the **adaptations of aquatic mammals.**

II. Answer any "FIVE" of the following questions: **5X10=50**

Each question carries **10 marks**)

11. a) Describe the General characters and classification of Chordata up to classes.

OR

b) Compare the structural features of **Petromyzon and Myxine**.

12. a) Describe the **respiratory system of Scoliodon**.

OR

b) Explain the **types of scales in Fishes**

13. a) Discuss the **structure and functions of the heart in Rana hexadactyla**.

OR

b) Write an essay on the **brain of Calotes**.

14. a) Describe the **digestive system of Columba livia**.

OR

b) Write notes on **migration in birds**.

15. a) Discuss the **dentition in Mammals with examples**.

OR

b) Write an essay on the **general characters of Mammals**.

APSCHE

SEMESTER-I COURSE 2: ANIMAL DIVERISTY-II BIOLOGY OF 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, labeled record of identified museum specimens

SYLLABUS:

1. Protochordata: Herdmania, Amphioxus, Amphioxus T.S through pharynx.
2. Cyclostomes: Petromyzon and Myxine.
3. Pisces: Pristis, Torpedo, Hippocampus, Exocoetus, Echeneis, Labeo, Catla, Clarius, Channa, Anguilla.
4. Amphibia: Ichthyophis, Ambystoma, Axolotl larva, Hyla,
5. Reptilia: Draco, Chamaeleon, Uromastyx, Testudo, Trionyx, Russel's viper, Naja, Krait, Hydrophis, Crocodile.
6. Aves: Psittacula, Eudynamis, Bubo, Alcedo.
7. Mammalia: Ornithorhynchus, Pteropus, Funambulus.
8. Dissections-As per UGC guidelines Scoliodon IX and X Cranial nerves, Scoliodon Brain
9. 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.pdf

Smt.N.P.Savithramma Govt.Degree College for Women,(A),Chittoor

Chittoor District-517002

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

Semester –I Syllabus for 2025-26

SEMESTER-I COURSE 2: ANIMAL DIVERISTY-II BIOLOGY OF CHORDATES

Practical	Paper code:25ZOO102P	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, labeled record of identified museum specimens

SYLLABUS:

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

2. Cyclostomes: Petromyzon and Myxine.

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

4. Amphibia: Ichthyophis, Ambystoma, Axolotl larva, Hyla,

5. Reptilia: Draco, Chamaeleon, Uromastyx, Testudo, Trionyx, Russel's viper, Naja, Krait, Hydrophis, Crocodile.

6. Aves: Psittacula, Eudynamis, Bubo, Alcedo.

7. Mammalia: Ornithorhynchus, Pteropus, Funambulus.

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

9. 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/dc64b77d8769325515d17c945e46

1b45.pdf

ZOOLOGY MAJOR BLUE PRINT FOR QUESTION PAPERS

Smt.N.P.Savithramma Govt.Degree College for Women,(A),Chittoor

Chittoor District-517002

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

Practical-Model Question Paper

SEMESTER-I COURSE 2: ANIMAL DIVERISTY-II BIOLOGY OF CHORDATES

Paper code: 25Z001O2P **Time:3hr** **Marks:50**

S.No	Questions	Marks
1	Draw a Labeled diagram of virtual dissection/ dissected animals of -- -- -- -- -- -- --	1X15 = 15M
2	Identification of five spotters/ models/ Slides/ photographs, draw a labeled neat diagram with salient features Note: One from each unit.	5 x 5 = 25 M
3	Record (5M)+ Viva voce (5 M)	10M
	Total	50M

DEPT OF ZOOLOGY

SEMESTER II

APSCHE

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

Smt.N.P.Savithramma Govt.Degree College for Women,(A),Chittoor

Chittoor District-517002

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

Semester –II Syllabus for 2025-26

COURSE 3: CELL & MOLECULAR BIOLOGY

Theory	Paper code:25ZOO203T	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 concept s 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:

After successful completion of this course, the student will be able to:

CO 1: Define and explain the structural and functional differences between prokaryotic and eukaryotic cells, and describe the organization of viruses, viroids, and mycoplasma. (Knowledge, Understanding)

CO 2: Illustrate the ultra-structure of animal cells using electron microscopy and explain the organization and functions of the plasma membrane, including its transport mechanisms. (Understanding, Application)

CO 3: Describe the structure and functions of major cell organelles such as the Golgi complex, endoplasmic reticulum, lysosomes, ribosomes, mitochondria, centriole, nucleus, and chromosomes.
(Understanding)

CO 4: Explain the processes of cell division and the regulation of the cell cycle, and evaluate abnormalities leading to cancer and apoptosis.
(Understanding, Evaluation)

CO 5: Interpret the bioenergetic pathways including glycolysis, Krebs cycle, and electron transport system, and relate them to cellular energy production.
(Application, Analysis)

CO 6: Explain the molecular mechanisms of DNA replication, transcription, and translation, emphasizing the flow of genetic information through the central dogma of molecular biology.
(Understanding, Application)

CO 7: Discuss gene expression in prokaryotes and eukaryotes, particularly the regulation of the Lac Operon system, and interpret its biological significance.
(Analysis, Evaluation)

CO 8: Identify and describe the structure, properties, and biological importance of biomolecules such as carbohydrates, proteins, and lipids, highlighting their role in cell structure and metabolism.
(Knowledge, Application)

COs and Pos MAPPING

index	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	Average
CO1	3.0	3.0	2.0	-	-	-	-	-	2.0	-	**2.5**
CO2	3.0	3.0	3.0	-	-	-	-	-	3.0	-	**3.0**
CO3	3.0	3.0	3.0	-	-	-	-	-	3.0	-	**3.0**
CO4	3.0	4.0	4.0	-	4.0	4.0	-	3.0	3.0	-	**3.57**
CO5	3.0	4.0	4.0	-	4.0	4.0	-	4.0	3.0	-	**3.71**
CO6	3.0	4.0	4.0	-	4.0	4.0	-	4.0	3.0	-	**3.71**
CO7	3.0	4.0	4.0	4.0	3.0	3.0	4.0	4.0	4.0	3.0	**3.6**
CO8	3.0	3.0	3.0	-	3.0	3.0	-	3.0	3.0	-	**3.0**
Average	**3.0**	**3.5**	**3.38**	**4.0**	**3.6**	**3.6**	**4.0**	**3.6**	**3.0**	**3.0**	**3.26**

COs and PSOs MAPPING

index	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	Average
CO1	-	3.0	3.0	-	-	-	-	-	-	-	**3.0**
CO2	-	3.0	3.0	-	-	-	-	-	-	-	**3.0**
CO3	-	3.0	3.0	-	-	-	-	-	-	-	**3.0**
CO4	-	4.0	4.0	4.0	4.0	-	-	3.0	3.0	-	**3.67**
CO5	-	4.0	4.0	4.0	4.0	-	-	4.0	4.0	-	**4.0**
CO6	-	4.0	5.0	4.0	4.0	4.0	-	4.0	4.0	-	**4.14**
CO7	-	4.0	4.0	4.0	4.0	-	4.0	4.0	-	4.0	**4.0**
CO8	-	3.0	3.0	-	-	-	-	3.0	-	-	**3.0**
Average	**-**	**3.5**	**3.62**	**4.0**	**4.0**	**4.0**	**4.0**	**3.6**	**3.67**	**4.0**	**3.48**

The CO–PO and CO–PSO mapping analyses collectively demonstrate that the course provides a well-balanced blend of **knowledge, comprehension, application, and analytical learning** as outlined in Bloom's taxonomy. The mappings confirm that the course outcomes (COs) are effectively aligned with both **broad programme objectives (POs)** and **discipline-specific competencies (PSOs)**. Students not only acquire fundamental and advanced zoological knowledge but also develop critical thinking, experimental skills, ethical awareness, and environmental consciousness. The average values across both tables indicate that the course design ensures progressive learning — from conceptual understanding to analytical problem-solving and applied zoological practice — thereby fulfilling the holistic educational goals of the Zoology programme.

In the tables, the **numerical values (1–5)** represent the **level of relationship or strength** of contribution between a Course Outcome (CO) and a Programme Outcome (PO) or Programme Specific Outcome (PSO).

- **Higher averages (≈ 4 – 5)** → indicate a **strong or very strong alignment**
  → meaning that the course outcomes contribute substantially to achieving that PO or PSO.
- **Moderate averages (≈ 2 – 3)** → indicate a **medium contribution**,
  → meaning the CO supports that outcome but not at an advanced level.
- **Lower averages (≈ 1 – 2)** → indicate a **weak or minimal linkage**,
  → meaning the CO only indirectly supports that PO/PSO.

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, **Peroxisomes and Glyoxysomes (Addition)**

2.3. Structure and functions of Mitochondria & Centriole

2.4. Structure and functions of Nucleus & Chromosomes, **Chromatin Organization (Euchromatin, Heterochromatin, Nucleosome Model – overview (Addition)**

Activity: Activity: Model preparation of /Quiz/Project/Peer teaching on the above cell organelles/Assignment /Students Seminar 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, **Cell Signaling and Communication (Basics – receptors, signal transduction, examples like insulin signaling) (Addition)**

3.2. Cell cycle – stages- check points- regulation

3.3. Abnormal cell growth- cancer- apoptosis (Over view)

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, **Basic Enzymes and Proteins Involved in Replication and Transcription (Addition)**

4.2. Basic concepts of - **DNA replication in Prokaryotes** (Modified) – 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 **in Prokaryotes** (Modified) – **Overview of Genetic Code (Addition),** 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. **Nucleic Acids – DNA and RNA: Structure and Types (Addition)**

5.3. Biomolecules- Carbohydrates (Glucose- structure-properties- biological importance only)

5.4. Biomolecules- Protein (Amino acid- structure- properties- biological importance only)

5.5. 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

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 Bruce Alberts, Molecular Biology of the Cell * Rastogi, Cytology *Varma & Aggarwal, Cell Biology *C.B. Pawar, Cell Biology * Molecular Biology by Frei fielder

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ZOOLOGY MAJOR BLUE PRINT FOR QUESTION PAPERS
PROGRAMME: B. Sc Honours in ZOOLOGY (MAJOR)

SEMESTER-II COURSE 3: CELL & MOLECULAR BIOLOGY

(FOR I YEAR- THEORY PAPER)

Time: 3hours **Max marks: 70**

S.NO	Type of Questions	No. of Questions Given	No. of Questions To be answered	Marks allotted to each question	Total Marks
1	PART-I: Short Answer Questions	10	05	04	**20**
2	PART-II: Essay Answer Questions	10	05	10	**50**
				TOTAL	**70**

Note:A total of 10 short answer questions will be given — 2 questions from each unit. There will be no alternative questions.Students may answer any five questions of their choice. A total of **10 essay-type questions** will be given — **2 questions from each unit**, with **one alternative choice** per unit.Students must **answer one question from each unit**

Smt.N.P.Savithramma Govt.Degree College for Women,(A),Chittoor

Chittoor District-517002

PROGRAMME – ZOOLOGY MAJOR

SEMESTER-II COURSE 3: CELL & MOLECULAR BIOLOGY

BLUE PRINT

UNIT	SHORT ANSWER QUESTIONS	LONG ANSWER QUESTIONS
I	2	2
II	2	2
III	2	2
IV	2	2
V	2	2

Smt.N.P.Savithramma Govt.Degree College for Women,(A),Chittoor

Chittoor District-517002

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

Model Question Paper

SEMESTER-II COURSE 3: CELL & MOLECULAR BIOLOGY

Paper code: 25ZOO203T **Time:3hr** **Marks:70**

I. Answer any "Five" of the following questions: **5X4=20**

Each carries four marks only

1. Define **prokaryotic and eukaryotic cells** and mention any Five differences between them.
2. Write short notes on the **fluid mosaic model of the plasma membrane.**
3. Describe the **structure of the Golgi complex.**
4. Write short notes on the **structure and function of mitochondria.**
5. What are the **checkpoints in the cell cycle** and why are they important?
6. Write short note on **Glycolysis**.
7. Describe the **Central Dogma of Molecular Biology.**
8. Write short notes on **transcription in prokaryotes** with emphasis on initiation.
9. Explain **gene expression in eukaryotes** in brief.
10. Write short notes on the **structure and biological importance of lipids.**

II. Answer any "FIVE" of the following questions: **5X10=50**

(Answer any FIVE questions. Each question carries 10 marks)

11. a) Describe the electron microscopic structure of an animal cell.

OR

b) Explain the transport functions of plasma membrane (active, passive, and facilitated).

12. a) Describe the structure and functions of Lysosomes

OR

b) Write an essay on the structure and functions of nucleus

13. a) Explain the process of mitosis with suitable diagrams.

OR

b) Discuss the krebs cycle.

14. a) Describe the process of DNA replication (semi-conservative and semi-discontinuous).

OR

b) Explain the mechanism of translation.

15. a) Explain the Lac operon model of gene expression in prokaryotes.

OR

b) Write short essays on the structure, properties and biological importance of Amino acids.

APSCHE

SEMESTER-II

COURSE 3: CELL & MOLECULAR BIOLOGY

Practical | Credits: 1 | 2 hrs./week

COURSE OBJECTIVES:

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

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)

RFERENCE 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

Smt.N.P.Savithramma Govt.Degree College for Women,(A),Chittoor

Chittoor District-517002

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

Semester –II Syllabus for 2025-26

COURSE 3: CELL & MOLECULAR BIOLOGY

Practical	Paper code:25Z00203P	Credits: 1	2 hrs./week

COURSE OBJECTIVES:

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

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)

RFERENCE 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

Smt.N.P.Savithramma Govt.Degree College for Women,(A),Chittoor

Chittoor District-517002

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

Practical-Model Question Paper

SEMESTER-II COURSE 3: CELL & MOLECULAR BIOLOGY

Paper code: **Time:3hr** **Marks:50**

S.No	Question	Marks
1	**Major Experiment** Ex- Preparation of temporary slides of Mitotic divisions with onion root tips	15
2.	**Minor Experiment** Ex- Test for carbohydrate in given biological sample (Benedicts test)	10
3	Identification of Three spotters/ models/ Slides/ photographs, draw a labeled neat diagram with salient features	3x5=15M
4	Record and Viva-voce	10M
	Total	50M

APSCHE

SEMESTER-II

COURSE 4: EMBRYOLOGY

Theory	Paper code:	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 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 Balinksy

 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, 8 th 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.

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Smt.N.P.Savithramma Govt.Degree College for Women,(A),Chittoor

Chittoor District-517002

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

Semester –II Syllabus for 2025-26

COURSE 4: EMBRYOLOGY

Theory	Paper code:25ZOO204T	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 able to –

CO 1: Describe the historical perspective and basic concepts of developmental biology including cell–cell interaction, pattern formation, and growth.
(Knowledge, Understanding)

CO 2: Explain the mechanisms of differential gene expression, cytoplasmic determinants, and asymmetric cell division in development.
(Understanding, Application)

CO 3: Discuss the processes of gametogenesis and fertilization, and differentiate between types of eggs and egg membranes.
(Knowledge, Understanding)

CO 4: Illustrate cleavage patterns, formation of various blastulae, fate maps, and early embryonic development of frog and chick up to gastrulation.
(Understanding, Application)

CO 5: Explain the fate of germ layers, formation and function of extra-embryonic membranes, and describe the types and functions of placenta.
(Understanding, Application)

CO 6: Evaluate the significance of amniocentesis and its role in prenatal diagnosis.
(Application, Evaluation)

CO 7: Describe metamorphosis in amphibians, highlighting hormonal regulation, and explain various modes of regeneration.
(Knowledge, Understanding)

CO 8: Discuss the concepts and theories of ageing and the effects of teratogenic agents on embryonic development.
(Understanding, Analysis)

CO 9: Compare the process of gastrulation in frog, chick, and mammal, emphasizing similarities and differences.
(Analysis, Evaluation)

CO 10: Explain the concept of embryonic induction and Spemann's organizer experiment, and describe organogenesis of skin and circulatory system in humans.
(Understanding, Application, Analysis)

COs and POs Mapping

index	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	Average
CO1	3.0	3.0	-	-	-	-	-	-	2.0	-	**2.67**
CO2	3.0	4.0	3.0	-	-	3.0	-	-	3.0	-	**3.2**
CO3	3.0	3.0	3.0	-	3.0	-	-	3.0	2.0	-	**2.83**
CO4	3.0	4.0	4.0	-	3.0	4.0	-	3.0	3.0	-	**3.43**
CO5	3.0	4.0	4.0	-	3.0	4.0	-	3.0	3.0	-	**3.43**
CO6	2.0	4.0	4.0	-	4.0	4.0	-	4.0	3.0	-	**3.57**
CO7	3.0	3.0	-	-	3.0	3.0	3.0	3.0	3.0	3.0	**3.0**
CO8	3.0	4.0	4.0	3.0	4.0	3.0	-	4.0	3.0	-	**3.5**
CO9	3.0	4.0	4.0	3.0	3.0	4.0	-	3.0	3.0	3.0	**3.33**
CO10	3.0	4.0	4.0	4.0	4.0	4.0	-	4.0	3.0	4.0	**3.78**
Average	**2.9**	**3.7**	**3.75**	**3.33**	**3.38**	**3.62**	**3.0**	**3.38**	**2.8**	**3.33**	**3.27**

COs and PSOs Mapping

index	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	Average
CO1	3.0	-	-	-	3.0	-	-	-	-	-	**3.0**
CO2	-	3.0	-	-	3.0	-	-	-	-	-	**3.0**
CO3	-	3.0	-	3.0	3.0	3.0	-	-	-	-	**3.0**
CO4	3.0	4.0	3.0	3.0	4.0	-	-	3.0	3.0	-	**3.29**
CO5	-	4.0	3.0	4.0	4.0	3.0	-	4.0	4.0	-	**3.71**
CO6	-	4.0	3.0	4.0	4.0	3.0	-	4.0	4.0	-	**3.71**
CO7	-	3.0	-	3.0	3.0	-	4.0	3.0	3.0	3.0	**3.14**
CO8	-	3.0	-	4.0	3.0	-	-	3.0	4.0	-	**3.4**
CO9	3.0	4.0	4.0	4.0	4.0	-	-	4.0	4.0	3.0	**3.75**
CO10	3.0	4.0	4.0	4.0	4.0	-	-	4.0	4.0	4.0	**3.88**
Average	**3.0**	**3.56**	**3.4**	**3.62**	**3.5**	**3.0**	**4.0**	**3.57**	**3.71**	**3.33**	**3.39**

In the tables, the **numerical values (1–5)** represent the **level of relationship or strength** of contribution between a Course Outcome (CO) and a Programme Outcome (PO) or Programme Specific Outcome (PSO).

- **Higher averages (≈ 4 – 5)** → indicate a **strong or very strong alignment**
  → meaning that the course outcomes contribute substantially to achieving that PO or PSO.
- **Moderate averages (≈ 2 – 3)** → indicate a **medium contribution**,
  → meaning the CO supports that outcome but not at an advanced level.
- **Lower averages (≈ 1 – 2)** → indicate a **weak or minimal linkage**,
  → meaning the CO only indirectly supports that PO/PSO.

The CO–PO and CO–PSO mapping analyses collectively demonstrate that the course provides a well-balanced blend of **knowledge, comprehension, application, and analytical learning** as outlined in Bloom's taxonomy. The mappings confirm that the course outcomes (COs) are effectively aligned with both **broad programme objectives (POs)** and **discipline-specific competencies (PSOs)**. Students not only acquire fundamental and advanced zoological knowledge but also develop critical thinking, experimental skills, ethical awareness, and environmental consciousness. The average values across both tables indicate that the course design ensures progressive learning — from conceptual understanding to analytical problem-solving and applied zoological practice — thereby fulfilling the holistic educational goals of the Zoology programme.

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 - **Cortical reaction and prevention of polyspermy (overview), Zygote activation and role of calcium ions (simplified)(Modified).**

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) and **Human placenta (Addition)**

3.4 Amniocentesis, **Chorionic villus sampling (CVS) (Addition)**

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 (Deleted)

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 (Deleted), Organogenesis of the nervous system (brief overview) – neural tube formation as an example of induction**.

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:

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 Embryology by V.B. Rastogi

 Austen CR and Short RV. 1980. Reproduction in Mammals. Cambridge University Press.

 Gilbert SF. 2006. Developmental Biology, 8 th 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.

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ZOOLOGY MAJOR BLUE PRINT FOR QUESTION PAPERS
PROGRAMME: B. Sc Honours in ZOOLOGY (MAJOR)

SEMESTER-II COURSE 4: EMBRYOLOGY

(FOR I YEAR- THEORY PAPER)

Time: 3hours **Max marks: 70**

S.NO	Type of Questions	No. of Questions Given	No. of Questions To be answered	Marks allotted to each question	Total Marks
1	PART-I: Short Answer Questions	10	05	04	**20**
2	PART-II: Essay Answer Questions	10	05	10	**50**
				TOTAL	**70**

Note:A total of 10 short answer questions will be given — 2 questions from each unit.

There will be no alternative questions.Students may answer any five questions of their choice.

A total of **10 essay-type questions** will be given — **2 questions from each unit**, with **one alternative choice** per unit.Students must **answer one question from each unit**

Smt.N.P.Savithramma Govt.Degree College for Women,(A),Chittoor

Chittoor District-517002

PROGRAMME – ZOOLOGY MAJOR

SEMESTER-II COURSE 4: EMBRYOLOGY

BLUE PRINT

UNIT	SHORT ANSWER QUESTIONS	LONG ANSWER QUESTIONS
I	2	2
II	2	2
III	2	2
IV	2	2
V	2	2
Total	10	10

Smt.N.P.Savithramma Govt.Degree College for Women,(A),Chittoor

Chittoor District-517002

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

Theory-Model Question Paper

SEMESTER-II COURSE 4: EMBRYOLOGY

Paper code: 25ZOO204T **Time:3hr** **Marks:70**

I. Answer any "Five" of the following questions: **5X4=20**

Each carries four marks only

1. Define **developmental biology** and briefly explain the **phases of development.**
2. Write short notes on **cytoplasmic determinants** and their role in early development.
3. Mention the **types of eggs** based on yolk and distribution, with examples.
4. Write short notes on the **structure and functions of egg membranes.**
5. Describe the **types and functions of extra-embryonic membranes.**
6. Write short notes on the **structure and functions of placenta.**
7. Explain the **modes of regeneration** in animals with examples.
8. Write short notes on the **theories of ageing.**
9. Describe **Spemann's organizer experiment** and its significance.
10. Write short notes on the **organogenesis of skin in humans.**

II. Answer any "FIVE" of the following questions: **5X10=50**

Each question carries 10 marks)

11. a) Explain **differential gene expression** during development.

OR

b) Discuss **cell–cell interaction and pattern formation** in early development.

12. a) Describe the processes of **spermatogenesis**

OR

b) Explain the **planes and patterns of cleavage**

13. a) Describe the **Amniocentesis**

OR

b) Write an essay on the **fate of germ layers** in vertebrate development.

14. a) Explain the **process and hormonal regulation of metamorphosis in amphibians**.

OR

b) Teratogenic agents and their effects on embryonic development

15. a) Compare **gastrulation in frog, chick and mammal**.

OR

b) Describe the **organogenesis of circulatory system** in humans.

APSCHE

SEMESTER-II

COURSE 4: EMBRYOLOGY

Practical	Paper code:	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

RFERENCE 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%207%20Chick%20Embryo.

pdf

 http://www.macollege.in/app/webroot/uploads/department_materials/doc_501.pdf

 http://www.zoologyresources.com/uploadfiles/books/dc64b77d8769325515d17c945e461b45.pdf

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Smt.N.P.Savithramma Govt.Degree College for Women,(A),Chittoor

Chittoor District-517002

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

Semester –II Syllabus for 2025-26

COURSE 4: EMBRYOLOGY

Practical	Paper code:25ZOO204P	Credits: 3	3 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

RFERENCE 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%207%20Chick%20Embryo.pdf
- http://www.macollege.in/app/webroot/uploads/department_materials/doc_501.pdf
- http://www.zoologyresources.com/uploadfiles/books/dc64b77d8769325515d17c945e461b45.pdf

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Smt.N.P.Savithramma Govt.Degree College for Women,(A),Chittoor

Chittoor District-517002

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

Practical-Model Question Paper

SEMESTER-II COURSE 4: EMBRYOLOGY

Paper code: 25Z00204P **Time:3hr** **Marks:50**

S.No	Question	Marks
1	**Major Experiment** Ex- Project report on chick embryo development	15
2	Identification of Five spotters/ models/ Slides/ photographs, draw a labeled neat diagram with salient features Note: Two from developmental stages of frog, Two from developmental stages of Chick, One from the Sections of Placenta	5x5=25M
4	Record and Viva voce	10M
	Total	50M

Dept of Zoology

Certificate Course

on

Introduction to Medical Lab Techniques

2025-2026

Smt.N.P.Savithramma Govt.Degree College for Women, (A), Chittoor

Chittoor District-517002

Department of Zoology

Certificate Course on *Introduction to Medical Lab Techniques*

2025-2026

S. No.	Heading	Particulars
1	**Title of the Course**	Certificate Course on *Introduction to Medical Lab Techniques*
2	**Eligibility for Admission**	Candidate who passed 10+2 examination with at least 55% marks in aggregate in Life sciences
3	**Passing Marks**	The candidate must obtain 35% of the total marks in theory and practical separately to pass the course.
4	**No. of contact classes**	Sixty hours
5	**Level**	Certificate
6	**Academic Year**	2025-2026

Course Objectives

1. To provide fundamental knowledge of laboratory safety, equipment handling, and maintenance procedures.
2. To train students in the proper use and operation of commonly used laboratory instruments.
3. To develop skills in the systematic collection, labeling, and preservation of biological samples for analysis.
4. To give practical exposure to microscopic examination and interpretation of various laboratory samples.
5. To offer hands-on experience in performing essential staining techniques used in diagnostic work.

6. To train students in the process of blood sample collection, blood grouping, and related hematological methods.
7. To familiarize learners with basic microbiological techniques, including bacterial identification tests.
8. To provide practical training in the preparation and sterilization of different types of culture media.

Learning Outcomes

1. Students will gain a clear understanding of laboratory safety measures, equipment maintenance, and sterilization methods.
2. Learners will be able to apply basic scientific procedures used in clinical diagnosis and disease investigation.
3. Students will acquire the ability to carry out different staining procedures and perform basic hematological tests.
4. Learners will develop the competency to recognize, isolate, and differentiate bacterial species using laboratory techniques.
5. Students will be equipped with the technical skills and confidence required to work effectively in a clinical or diagnostic laboratory setting.

Module I: Laboratory Organization, Safety, and Equipment Handling (12 Hours)

- Structure and layout of a clinical laboratory
- Good laboratory practices (GLP), Personal protective equipment (PPE) and biosafety levels
- Sterilization and disinfection methods (autoclave, hot air oven, filtration, chemical methods)
- Biomedical waste management and first aid in laboratory accidents
- Introduction to common laboratory instruments: microscope, centrifuge, colorimeter, pH meter, and balance

Module II: Sample Collection, Processing & Hematology, Blood Analysis (12 Hours)

- Types of clinical samples: blood, urine, stool, sputum, and swabs
- Methods of collection, labeling, preservation, and transportation
- Anticoagulants and preservatives: types and uses
- Composition and functions of blood

- Blood collection techniques, precautions, and storage
- Determination of blood groups (ABO and Rh typing)
- Hemoglobin estimation, total RBC and WBC counts, differential count
- Peripheral blood smear preparation and observation
- Interpretation of abnormal blood profiles (anemia, leukemia, infection)

Module III: Microbiology and Infectious Diseases (12 Hours)

- Introduction to microorganisms: bacteria, fungi, viruses, and parasites
- Common human pathogenic microbes and diseases caused (e.g., *Staphylococcus*, *E. coli*, *Mycobacterium tuberculosis*, *Candida*, *Plasmodium*, *Influenza virus*)
- Collection and processing of microbial samples
- Preparation and sterilization of media (nutrient agar, MacConkey, blood agar)
- Culture methods: streak, pour, and spread plate techniques
- Identification of bacteria using staining and biochemical

Module IV: Diagnostic Techniques and Disease Detection (12 Hours)

- Principles of immunological and biochemical diagnostic tests
- Tests for detection of common diseases:
    - Typhoid – Widal test
    - Malaria – Peripheral smear / Rapid test
    - Tuberculosis – Acid-fast staining
    - Diabetes – Blood glucose estimation
    - Kidney disorders – Urine analysis (albumin, sugar, pH)
    - Liver function – Bilirubin test (brief overview)
- Interpretation of test reports and patient result recording

Practical Syllabus (12 Hours)

- Demonstration of PPE use
- Sterilization techniques (autoclaving, dry heat, filtration)
- Identification and operation of instruments

- Cleaning and care of microscope
- Demonstration of blood sample collection (using mannequins or models)
- Preparation and labeling of sample containers
- Preservation of samples for microbiological and biochemical tests
- Demonstration and performance of blood grouping
- Estimation of hemoglobin using Sahli's method
- RBC and WBC total count using Neubauer chamber
- Preparation of nutrient agar and broth media
- Inoculation and incubation of microbial cultures
- Observation of colony morphology and recording results
- Tests for detection of common diseases

Evaluation Method:

Evaluation and Mark Distribution

Component	**Type of Assessment**	**Maximum Marks**
1. Final Theory Examination	Multiple Choice Questions (40 × 1 mark each)	**40**
2. Attendance and Participation	Continuous Internal Assessment	**10**
3. Practical Records and Assignments	Continuous Internal Assessment	**10**
4. Viva Voce	Oral Examination (Conceptual and Practical Knowledge)	**10**
5. Final Practical Examination	Descriptive Type Practical Test	**30**
Total Marks		**100**

Theory Question Paper Pattern

- **Total Marks:** 40
- **Question Type:** Multiple Choice Questions (MCQs)
- **Number of Questions:** 40
- **Marks per Question:** 1 mark each
- **Duration:** 1 Hour

Distribution of Questions (Approximate):

Module	Topics Covered	No. of Questions	Marks
I	Laboratory Safety and Equipment Handling	10	10
II	Sample Collection and Hematology	10	10
III	Microbiology and Infectious Diseases	10	10
IV	Diagnostic and Biochemical Techniques	10	10
Total		**40**	**40**

Final Practical Examination – Descriptive Type

Course Title: Certificate Course on *Introduction to Medical Lab Techniques*
Duration: 1½ Hours
Maximum Marks: 30 (Practical) + 10 (Viva Voce)

Question Paper Pattern (Practical – 30 Marks)

Section	Type of Question	Marks	Remarks / Examples
Section A	**Major Experiment (Any One)**	**12 Marks**	Perform one major experiment involving standard procedures and interpretation. *Examples:* - Blood grouping (ABO and Rh typing) - Gram staining and bacterial identification - Hemoglobin estimation by Sahli's method - Preparation and inoculation of nutrient agar plate
Section	**Minor**	**8 Marks**	Perform one short practical task based on sample

Section	Type of Question	Marks	Remarks / Examples
B	**Experiment (Any One)**		handling or routine lab test. *Examples:* - Preparation of smear and simple staining - Urine analysis for albumin/sugar - Preparation of disinfectant solution - Observation of blood cells under microscope
Section C	**Spotters (Any Five out of Seven)**	**10 Marks (2 marks each)**	Identify and write short notes on given laboratory specimens, instruments, slides, or tests. *Examples:* Microscope parts, stains, microscope, centrifuge, colorimeter, pH meter, slides of bacteria, media types, diagnostic kits, or safety symbols.

Note:

All theory and practical evaluations will be conducted **internally**.

There will be **no external examination or evaluation** for theory and practical.

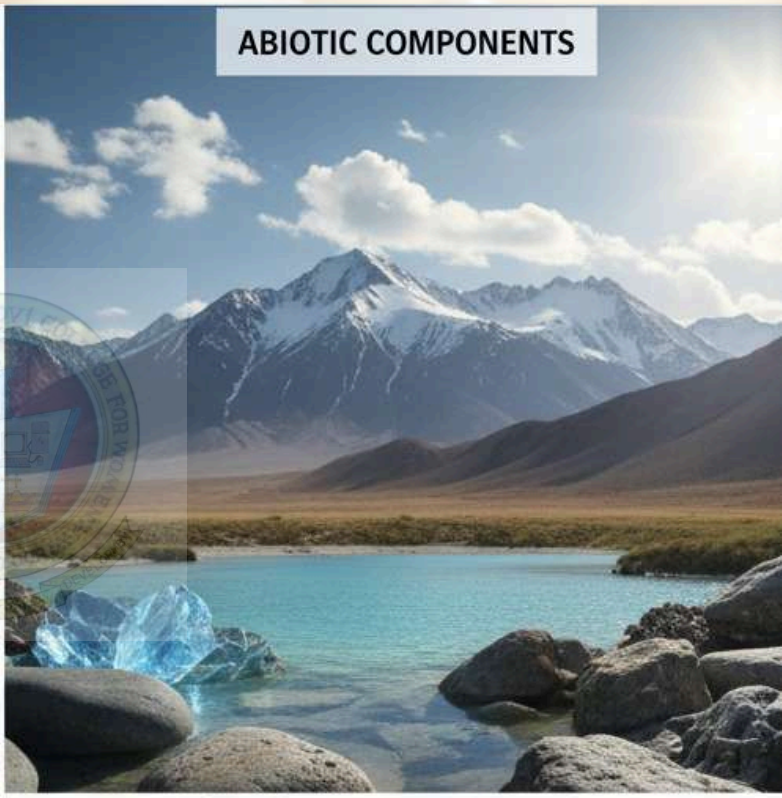
Dept of Zoology

Value added Course

on

Environmental Biology

2025-2026



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Chittoor District-517002

Department of Zoology

Value added Course on *Environmental Biology*

2025-2026

S. No.	Heading	Particulars
1	**Title of the Course**	**Value added Course on *Environmental Biology***
2	**Eligibility for Admission**	Candidate who passed 10+2 examination with at least 55% marks in aggregate in Life sciences
3	**Passing Marks**	The candidate must obtain 35% of the total marks in the exam
4	**No. of contact classes**	Forty hours
5	**Level**	Certificate
6	**Academic Year**	2025-2026

Value added Course on Environmental Biology

Objectives

- To introduce students to the **basic principles of Environmental Biology**.
- To create awareness about **biodiversity, conservation, and sustainable use of natural resources**.
- To provide knowledge on **environmental pollution, climate change, and mitigation strategies**.
- To train students in **practical and field-based techniques** related to environmental monitoring.

- To encourage students to take up **community-based environmental projects** for societal benefit.

Learning Outcomes

By the end of this course, students will be able to:

Cognitive Domain (Knowledge and Understanding)

1. **Explain** the scope and interdisciplinary nature of Environmental Biology and its importance in modern society.
2. **Describe** the relationship between organisms and their physical environment across different ecological levels (population, community, ecosystem).
3. **Identify and classify** various ecosystems and understand their structural and functional components, including energy flow and biogeochemical cycles.
4. **Explain** the concepts of biodiversity, its levels, importance, threats, and strategies for conservation (in-situ and ex-situ).
5. **Recognize** the causes, effects, and control measures of major environmental pollutants—air, water, soil, and noise—including modern concerns such as **plastic and microplastic pollution**.
6. **Understand** global environmental issues such as **climate change, global warming, ozone depletion, deforestation, desertification, and urbanization**, and their implications on human health and ecosystems.
7. **Discuss** the principles of **sustainable development**, **circular economy**, **renewable energy**, and **environmental ethics** in the context of current environmental challenges.

Affective Domain (Attitudes and Values)

8. **Develop sensitivity** towards environmental issues and demonstrate a commitment to protect and conserve biodiversity and natural resources.
9. **Appreciate** the role of local communities and indigenous knowledge in environmental conservation.
10. **Adopt ethical values** and a sustainable lifestyle by applying the principles of reduce, reuse, recycle, and responsible consumption.
11. **Participate actively** in awareness programs, campaigns, and community-based environmental activities.

Psychomotor Domain (Skills and Application)

12. **Perform basic environmental monitoring techniques**, including measurement of air and water quality parameters (e.g., pH, DO, BOD, COD, particulate matter).
13. **Carry out simple field-based biodiversity assessments** using quadrat, transect, and species richness methods.
14. **Prepare and present a mini-project report** based on a field study or environmental awareness campaign.
15. **Use ICT tools and environmental databases** to collect, analyze, and interpret environmental data.
16. **Demonstrate practical understanding** of **waste segregation, composting, e-waste handling**, and **bioremediation methods**.

➢ **Course Structure / Modules**

Module 1: Introduction to Environmental Biology

- Scope and importance of Environmental Biology
- Relationship between organisms and environment
- Levels of ecological organization (population, community, ecosystem)

Module 2: Ecosystems and Biodiversity

- Structure and function of ecosystems
- Energy flow and nutrient cycles
- Role of microbes in ecosystem balance and biodegradation
- Invasive species and their ecological impacts
- Biodiversity – types, importance, and threats
- Conservation of biodiversity (in-situ and ex-situ)

Module 3: Environmental Pollution

- Air, water, soil, and noise pollution: sources, effects, and control measures
- Solid and liquid waste management and e-waste issues

- Plastic and microplastic pollution: sources, impacts, and mitigation strategies
- Emerging contaminants (pharmaceuticals, pesticides, and heavy metals)
- Bioremediation
- Case studies on local/regional pollution problems

Module 4: Environmental Issues and Sustainable Development

- Climate change, global warming, and ozone depletion
- Deforestation, desertification, and urbanization impacts
- Sustainable development goals (SDGs) and environmental ethics
- Bioindicators in monitoring pollution

Module 5: Applied Environmental Biology (Practical Component)

- Methods of measuring air and water quality (basic techniques)
- Visit to a waste management facility or renewable energy plant
- Field visit to a biodiversity hotspot / water body / industrial area etc.
- Community awareness project on environmental issues
- Preparation of a short project report

Evaluation Method (Total Marks: 100)

Component	**Details**	**Marks**	**Mode of Evaluation**
A. Theory Component	*(Understanding of concepts, principles, and current issues in Environmental Biology)*	**40 Marks**	
1. **Written Examination**	- Based on Modules 1–4 - Duration: 1 hour 30 minutes	30	Departmental Examination / Internal Assessment (Objective)
2. **Class Participation / Continuous**	- Attendance and active involvement in class discussions, assignments, and	10	Instructor's Record / Observation

Component	Details	Marks	Mode of Evaluation
Assessment	quizzes		
B. Practical / Fieldwork Component	*(Skill-based learning through experiments, field visits, and data analysis)*	**30 Marks**	
3. **Practical Record / Field Notebook**	- Maintenance of records on environmental monitoring (air, water, biodiversity studies, etc.)	10	Laboratory / Field Evaluation
4. **Field Visit Report / Case Study**	- Report on biodiversity hotspot / water body / industrial area visit - Evaluation based on observation, data presentation, and interpretation	10	Viva-voce / Report Evaluation
5. **Viva-Voce on Practical / Field Activities**	- Oral assessment on environmental monitoring methods, tools, and findings	10	Individual Oral Exam
C. Project / Community Engagement Component	*(Application of knowledge to real-life or community-based issues)*	**30 Marks**	
6. **Mini Project / Case Study Report**	- Short project on an environmental issue such as waste management, biodiversity survey, water quality, or awareness campaign	20	Evaluation of Written Report
7. **Presentation / Demonstration**	- Individual or group presentation of findings or awareness activity outcome	10	Departmental Presentation / Peer Review
Total		**100 Marks**	

Distribution Summary

- **Theory** – 40 Marks (40%)
- **Practical & Fieldwork** – 30 Marks (30%)
- **Project / Case Study / Community Work** – 30 Marks (30%)
- **Total** – 100 Marks (100%)

Evaluation Criteria (Qualitative Indicators)

Criterion	Weightage Description
Knowledge and Understanding	Concept clarity, definitions, and ability to relate theory with practice
Application and Analytical Skills	Data collection, analysis, and interpretation in field/practical work
Creativity and Problem-Solving	Innovation in project ideas and solutions for environmental issues
Communication Skills	Report writing, oral presentation, and participation in discussions
Ethical and Environmental Awareness	Responsible behavior, environmental ethics, and teamwork during field activities

Passing Criteria

- **Minimum 30% marks** in each component (Theory and Practical/Project)
- **Overall minimum 40 marks** (aggregate) required for successful completion

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Department of Zoology

Value added Course on *Environmental Biology*

Model Question Paper

2025-2026

Maximum Marks: 30 **Time:** 1 Hour 30 Minutes

Instructions:

1. All questions are compulsory.
2. Each question carries **1 mark**.
3. Choose the most appropriate answer and write the correct option (A/B/C/D).
4. No negative marking.

SECTION – A: Multiple Choice Questions (20 × 1 = 20 Marks)

1. The study of the relationship between living organisms and their environment is called:
   A) Ecology B) Genetics C) Cytology D) Evolution
2. The smallest unit of ecological organization is:
   A) Ecosystem B) Community C) Population D) Biosphere
3. The term "biosphere" was first used by:
   A) Vernadsky B) Odum C) Haeckel D) Linnaeus
4. Interaction between organisms for the same food source is known as:
   A) Parasitism B) Mutualism C) Competition D) Commensalism
5. The primary source of energy in an ecosystem is:
   A) Water B) Sunlight C) Soil D) Air
6. The flow of energy in an ecosystem is:
   A) Cyclic B) Linear C) Reversible D) Constant
7. The variety of species present in an ecosystem is called:
   A) Genetic diversity B) Species diversity C) Habitat diversity D) Community diversity

8. In-situ conservation refers to:
   A) Conservation outside the habitat B) Conservation in natural habitat
   C) Captive breeding D) Gene banking

9. The "biodiversity hotspot" concept was proposed by:
   A) E.O. Wilson B) Norman Myers C) Charles Elton D) G. Evelyn Hutchinson

10. The biogeochemical cycle involving nitrification and denitrification is:
    A) Water cycle B) Nitrogen cycle C) Carbon cycle D) Oxygen cycle

11. The main pollutant of photochemical smog is:
    A) Sulphur dioxide B) Ozone C) Carbon monoxide D) Nitrogen oxides

12. Blue Baby Syndrome is caused by:
    A) Arsenic B) Fluoride C) Nitrates D) Lead

13. Which of the following is a biodegradable waste?
    A) Plastic bottle B) Paper C) Aluminum can D) Glass

14. The noise level is measured in:
    A) Hertz B) Decibel C) Joule D) Ampere

15. The term **microplastics** refers to:
    A) Small glass pieces B) Plastic particles <5 mm C) Synthetic fibers D) Plastic bottles

16. The gas mainly responsible for global warming is:
    A) Nitrogen B) Methane C) Carbon dioxide D) Sulphur dioxide

17. The ozone layer is found in the:
    A) Troposphere B) Mesosphere C) Stratosphere D) Thermosphere

18. The UN's Sustainable Development Goals (SDGs) aim to be achieved by:
    A) 2025 B) 2030 C) 2040 D) 2050

19. Deforestation leads to:
    A) Increased rainfall B) Soil erosion C) Increase in biodiversity D) None of the above

20. The ethical principle that stresses the value of all forms of life is called:
    A) Anthropocentrism B) Ecocentrism C) Biocentrism D) Technocentrism

SECTION – B: Fill in the Blanks (5 × 1 = 5 Marks)

21. The process by which green plants convert solar energy into chemical energy is called _____.

22. The main cause of acid rain is the emission of _____ and _____ gases.

23. The interrelationship of organisms with their physical surroundings is studied under _____.

24. A place where species are conserved outside their natural habitat is called a _____.

25. The international agreement to control greenhouse gas emissions is known as the _____ Protocol.

SECTION – C: Match the Following (5 × 1 = 5 Marks)

Column A		**Column B**
26. Air pollution	( )	a) Kyoto Protocol
27. Biodiversity conservation	( )	b) Bioindicator species
28. Climate change	( )	c) Afforestation
29. Water pollution	( )	d) Suspended particulates
30. Sustainable development	( )	e) Reduce, Reuse, Recycle

B. PRACTICAL / FIELDWORK COMPONENT (30 Marks)

Model Practical / Fieldwork Examination Paper

Maximum Marks: 30 **Duration:** 1 Hour

Question Paper Pattern

Q. No.	**Question**	**Marks**
1.	Conduct an **environmental monitoring experiment** and record your observations. (Choose any one as allotted by examiner): a) Determination of pH and turbidity of a water sample. b) Measurement of air quality (particulate matter / CO_2 concentration). c) Study of noise levels using a decibel meter. d)Study of biodiversity in college campus / nearby park e) Visit to a local industry / water treatment plant Write the **principle, procedure, observations, and inference.**	10
2.	Prepare a **field notebook entry** based on your visit to a biodiversity hotspot / water body / industrial area. Mention: – Date and location of visit – Ecological observations (flora, fauna, abiotic factors)	10

Q. No.	Question	Marks
	– Environmental problems noticed and possible solutions	
3.	**Viva-Voce:** Answer any **five** questions from the following based on your practicals and field activities: i. What are the major water quality parameters? ii. Define DO and its significance. iii. Mention any two air pollutants and their sources. iv. What are bioindicators? Give one example. v. What is solid waste management? vi. How is biodiversity conservation linked with sustainability?	10
Total Marks		**30**

Section c Project / Case Study Evaluation Paper

Suggested Project / Case Study Topics and Activities	Marks
Mini Project / Case Study Report — Prepare and submit a short project report on any one of the following environmental issues (10–15 pages typed or neatly handwritten): Include introduction, objectives, methods, results, discussion and conclusion. • Plastic-Free Campus Initiative – survey and awareness campaign. • Water Quality Assessment of local ponds or tanks (pH, DO, pollutants). • Biodiversity Documentation of college campus or nearby ecosystem. • Household Waste Segregation and Composting practices. • Impact of Urbanization on Local Flora and Fauna. • Community Awareness Programme on Climate Change, Solid Waste Management, or SDGs.	**20**
Presentation / Demonstration — Present the project findings before faculty and students using charts, PowerPoint, or models. Evaluation based on clarity, organization, and communication skills. • Poster or PPT presentation with photos, graphs, and data. • Community Awareness Activity (e.g., skit, rally, or slogan display). • Demonstration of eco-friendly practice (e.g., composting, seed-ball making).	**10**
Total Marks	**30**

JUSTIFICATION TABLE

S.No	Semester	Title of the Paper	Unit	Revised Topic (Deleted / Modified / Added)	Justification
1	I	Animal Diversity – I (Biology of Non-Chordates)	I	*Importance of Classification and Modern Trends in Animal Classification* – Added	Introduced to give students an updated understanding of taxonomic principles and recent molecular/systematic approaches in classification.
2			I	*Parasitic Protozoans* – Added	Added to highlight medically and economically important protozoans and their parasitic adaptations.
3			II	*Role of Sponges in Biotechnology / Marine Biotechnology & Ecological Services* – Added	Emphasizes applied and ecological significance of Porifera in biotechnology.
4			II	*Role of Corals in Biotechnology / Marine Biotechnology & Ecological Services* – Added	Highlights corals' ecological and biotechnological importance for reef conservation awareness.
5			III	*Host–parasite interactions and immunological responses in helminth infections* – Added, replacing *Parasitic Adaptations* – Deleted	Updated to include host–immune mechanisms and replace general adaptation topic.
6			IV	*Economic importance*	To stress the agricultural, economic,

S.No	Semester	Title of the Paper	Unit	Revised Topic (Deleted / Modified / Added)	Justification
	I			***of Insects*** **– Added**	**and ecological roles of insects.**
7			**V**	***Economic importance of Molluscans*** **– Added**	**Highlights economic value (pearls, shells, food resources).**
8		**Animal Diversity – II (Biology of Chordates)**	**I**	***Evolutionary trends in Chordata*** **– Added**	**Strengthens evolutionary understanding across chordate classes.**
9			**II**	***Evolutionary trends in fishes*** **– Added**	**Enhances comparative study of vertebrate evolution.**
10			**II**	***Migration in fishes – causes, types, ecological & economic significance –*** **Modified/Expanded**	**Adds ecological and economic context for holistic comprehension.**
11			**III**	***Classification of Reptilia; Identification of Poisonous Snakes; Venom types and their importance to humans and ecosystem*** **– Added** Calotes: External features, Digestive system, structure and function of Brain (Deleted)	**Brings applied zoology and safety awareness into reptile study.** **No special features are there.**
12			**IV**	***Migration in birds – causes, types, ecological, conservation &***	**Expands topic to include conservation aspects.**

S.No	Semester	Title of the Paper	Unit	Revised Topic (Deleted / Modified / Added)	Justification
				economic significance – Modified/Expanded	
14	II	Cell & Molecular Biology	II	*Peroxisomes & Glyoxysomes* – Added	Provides complete coverage of metabolic organelles.
15			II	*Chromatin Organization (Euchromatin, Heterochromatin, Nucleosome Model)* – Added	Strengthens understanding of gene regulation and chromatin structure.
16			III	*Cell Signaling and Communication (Basics – receptors, transduction, e.g., insulin signaling)* – Added	Introduces modern molecular signaling pathways.
17			IV	*Basic enzymes & proteins in replication and transcription* – Added	Gives molecular clarity about enzymes in DNA/RNA processes.
18			IV	*DNA replication – clarified to prokaryotic replication* – Modified	Focus narrowed for conceptual clarity.
19			IV	*Translation described as Translation in Prokaryotes* – Modified	Improves precision of molecular mechanisms.
20			IV–V	*Overview of Genetic Code* and *Nucleic Acids (DNA & RNA: Structure and Types)* –	Enhances basic molecular genetics foundation.

S.No	Semester	Title of the Paper	Unit	Revised Topic (Deleted / Modified / Added)	Justification
	II			Added	
21		Embryology	II	*Fertilization – Cortical reaction, prevention of polyspermy, Zygote activation, Calcium ion role* – Modified	Adds physiological and molecular basis of fertilization.
22			III	*Human Placenta* – Added	Adds human developmental relevance.
23			III	*Amniocentesis and Chorionic Villus Sampling (CVS)* – Added	Introduces modern prenatal diagnostic techniques.
24			IV	*Ageing: Concepts and Theories* – Deleted	Removed to avoid overlap and streamline syllabus.
25			V	*Organogenesis of Skin* – Deleted; *Organogenesis of Nervous System & Neural Tube Formation (as induction example)* – Added/Modified	Focus shifted to illustrate embryonic induction concept.

PAPER SETTERS / EXAMINERS

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Smt.N.P.Savithramma Govt.Degree College for Women, (A), Chittoor

Chittoor District-517002

Minutes For Board of Studies in Zoology

Date: 25-10-2025
Time: 11:00 AM
Chairperson: Mr. K. Nagaraju

The Board of Studies meeting of the Department of Zoology, Smt. N.P.Savithramma Govt. Degree College for Women (A), Chittoor, was held on 25th October 2025 at 11:00 AM under the chairmanship of Mr. K. Nagaraju. The meeting was convened as per the given agenda, and after detailed discussions on all the items, the members unanimously passed the resolutions.

Resolutions

1. The Board resolved to **revise, update, and modify** the **UG (B.Sc. Zoology Honours) I Semester Course-1**, entitled *Animal Diversity–I: Biology of Non-Chordates*, including the **syllabus, model question paper, and blueprint** as per recent curriculum requirements.
2. It was resolved to **revise and update** the **UG (B.Sc. Zoology Honours) I Semester Course-2**, entitled *Animal Diversity–II: Biology of Chordates*, with necessary modifications in the **syllabus, model question paper, and blueprint**.
3. The Board approved the **revision of UG (B.Sc. Zoology Honours) II Semester Course-3**, entitled *Cell and Molecular Biology*, by updating the **syllabus, model question paper, and blueprint** in line with academic advancements.
4. The Board resolved to **revise and modify** the **UG (B.Sc. Zoology Honours) II Semester Course-4**, entitled *Embryology*, along with its **syllabus, model question paper, and blueprint**.
5. The Board discussed and unanimously **approved the Certificate Course on "Introduction to Medical Lab Techniques"** with suitable modifications wherever necessary.
6. The Board approved the **Scheme and Syllabus for Value-Added Courses** on ***Environmental Biology***.
7. The Board resolved to **approve the external and internal scheme of examination** for B.Sc. Zoology (Honours) I Semester under CBCS guidelines.

8. The Board unanimously **approved the panel of question paper setters and examiners** for B.Sc. Zoology (Honours).
9. The Board resolved to **approve innovative teaching methodologies and evaluation patterns** under CBCS for effective implementation.
10. The Board approved **industrial and field-based student study projects, study tours, and area study programmes** for the academic year 2025–2026.
11. The Board resolved to **approve proposals for organizing seminars, conferences, workshops, and research projects** under the autonomous grant for the academic year 2025–2026.
12. The Board unanimously approved **community-based extension activities, student and faculty exchange programmes, and other academic/extra-curricular activities** of the Department for the academic year 2025–2026.
13. The Board discussed and **approved suggestions regarding evaluation and assessment patterns** for B.Sc. Zoology (Honours).
14. Under any other matter, the Board resolved that **new academic and research proposals submitted with the permission of the Chair** may be considered and implemented after due process.

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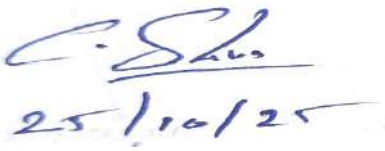
Chittoor District-517002

Board of Studies 2025-2026

S.NO	**Members Present**	**Signature with date**
1.	Sri. K. Nagaraju	
2.	Smt. C. Komala Devi	
3.	Dr. C. Venkata Krishnaiah	
4.	Dr. D. Veera Nagendra Kumar	
5.	Dr. K.R. Shanmugam	
6.	C. Siva	
7.	Dr. D. Saritha	

Dept of Zoology

BoS Meeting 25/10/2025