

DEPARTMENT OF ZOOLOGY
BOS 2026-27



**EMPOWERING STUDENTS WITH KNOWLEDGE, SKILLS,
ETHICS, AND SCIENTIFIC TEMPER FOR A BETTER
TOMORROW.**

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

BOARD OF STUDIES FOR THE A.Y. 2026-27 [R25 Curriculum]

The Board of Studies meeting in Zoology for the academic year 2026–27 was conducted in the Department of Zoology on 06-08-2026 at 11:00 A.M., with Smt C. Komaladevi, 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.	Smt.C.Komala Devi, M.Sc., B.Ed., (Ph.D) Lecturer in Zoology, Smt.N.P.Savithramma Govt. Degree College for Women (A), Chittoor	Chairperson (In-charge of the Department)	
2.	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)	
3.	Dr.K.R.Shanmugam MSc, PhD Associate Professor PRR&VS Government Degree College Vidavaluru (Vikramasimhapuri University,SPSR Nellore) krshanmugamphd@gmail.com 9440079415	Subject experts (Two experts in the subject from outside the college to be nominated by the Academic Council)	
4.	Sri K.Nagaraju M.Sc., M.Ed, NET & SET, (Ph .D) Lecturer in Zoology, SCNR Govt. Degree College, Proddatur (Yogi Vemana university,YSR Kadapa) koppunagarajumail@gmail.com 9493441321	Subject experts (Two experts in the subject from outside the college to be nominated by the Academic Council	

5.	C Siva, B.Com LLB. Proprietor of Eeshan Silks, Chittoor, Shiva.bjc@gmail.com 9786308628	Industry Representative	
6.	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 Honors) III Semester Course-5**, entitled *Genetics* (Syllabus, Model Question Paper, and Blueprint).
 2. Update/Revise/Modify the **UG (B.Sc. Zoology Honors) III Semester Course-6**, entitled *Evolution and Zoogeography* (Syllabus, Model Question Paper, and Blueprint).
 3. Update/Revise/Modify the **UG (B.Sc. Zoology Honors) III Semester Course-7**, entitled *Animal Physiology: Life sustaining systems* (Syllabus, Model Question Paper, and Blueprint).
 4. Update/Revise/Modify the **UG (B.Sc. Zoology Honors) IV Semester Course-8**, entitled *Immunology* (Syllabus, Model Question Paper, and Blueprint).
 5. Update/Revise/Modify the **UG (B.Sc. Zoology Honors) IV Semester Course-9**, entitled *Animal Biotechnology* (Syllabus, Model Question Paper, and Blueprint)
 6. Update/Revise/Modify the **UG (B.Sc. Zoology Honors) IV Semester Course-10**, entitled *Wildlife and Conservation Biology* (Syllabus, Model Question Paper, and Blueprint)
 7. Discussion and approval of the **Certificate Course** on *Introduction to Medical Lab Techniques*.
 8. Discussion and approval of the **External and Internal Scheme of Examination** for all semesters of B.Sc. Zoology (Honors).
 9. .Approval of the **Panel of Question Paper Setters and Examiners** for B.Sc. Zoology (Honors).
 10. Approval of the **Methodology for Innovative Teaching and Evaluation** under CBCS for B.Sc. Zoology (Honors).
 11. Consideration and approval of **Proposals for Industrial and Field-based Student Study Projects, Study Tours, and Area Study Programme** for the academic year 2026–2027.
 12. Consideration and approval of **Proposals for Organizing Seminars, Conferences, Workshops, and Research Projects** under the autonomous grant for the academic year 2026–2027.
 13. Consideration and approval of **Proposals for Community-based Extension Activities, Student and Faculty Exchange Programme, and other Academic and Extra-curricular Activities** of the Department for the academic year 2026–2027.
 14. Discussion and approval of **Suggestions regarding Evaluation and Assessment Patterns** for B.Sc. Zoology (Honors).
- Any other proposals with the **permission of the Chair**

B.SC. ZOOLOGY (HONORS)
ACADEMIC YEAR:: 2025-28 (R25)
SECOND YEAR (SEMESTER III & IV) COURSE STRUCTURE

Year	Semester	Paper/ Course	Subject title	Paper code	Hrs/ Weeks	Credits	IA	EA	Total
II	III	5	Genetics	25ZOO205T	3	3	30	70	100
		5	Genetics Practicals	25ZOO205P	2	1		50	50
		6	Evolution and Zoogeography	25ZOO206T	3	3	30	70	100
		6	Evolution and Zoogeography Practicals	25ZOO206P	2	1		50	50
		7	Animal Physiology: Life sustaining systems	25ZOO307T	3	3	30	70	100
		7	Animal Physiology: Life sustaining systems Practicals	25ZOO307P	2	1		50	50
	IV	8	Immunology	25ZOO408T	3	3	30	70	100
		8	Immunology Practicals	25ZOO408P	2	1		50	50
		9	Animal Biotechnology	25ZOO409T	3	3	30	70	100
		9	Animal Biotechnology Practicals	25ZOO409P	2	1		50	50

II		10	Wildlife and Conservation Biology	25ZOO4010T	3	3	30	70	100
		10	Wildlife and Conservation Biology Practicals	25ZOO4010P	2	1		50	50

Zoology – Blueprint for External Question Papers (Theory), III and IV 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), III and IV 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) III and IV Semester

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

Note:

1. The internal assessment for each course of the B.Sc. Zoology (Honours) programme will be conducted for a total of **60 marks**, which will subsequently be **scaled down 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

ACADEMIC YEAR:: 2025-28 (R25)

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.

CURRICULUM:: 2025-28(R25)

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.

APSCHE

SEMESTER-III

COURSE 5: GENETICS

Theory

Paper code:

Credits: 3

3 hrs/week

COURSE OBJECTIVES:

- To provide the background knowledge on the history of genetics and the importance of Mendelian principles.
- To provide the required knowledge on the gene interactions
- To acquaint the students, distinguish between polygenic, sex-linked, and multiple allelic modes of inheritance and extrachromosomal inheritance.
- To understand the principles of sex determination in animals with a reference to human being, and sex-linked inheritance
- To understand the human karyotyping and the concept of pedigree analysis basics.

LEARNING OUTCOMES:

By the completion of the course student will able to –

- To understand the history of genetics, gain knowledge basic terminology of genetics
- To acquire knowledge on interaction of genes, various types of inheritance patterns existing in animals with reference to non-Mendelian inheritance.
- To acquire knowledge on chromosomal inheritance
- Acquiring in-depth knowledge on various of aspects of genetics involved in sex determination,
- Acquiring in-depth knowledge on human karyotyping, pedigree analysis and Chromosomal disorders concepts of proteomics and genomics

SYLLABUS:

UNIT-I:

- 1.1 History of Genetics- Concepts of Phenotype, Genotype, Heredity, Variation, Pure lines and Inbreed Lines
- 1.2 Mendelian Principles on Monohybrid cross,
- 1.3 Back cross and Test cross
- 1.4 Mendelian Principles on Dihybrid cross

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

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

UNIT-II:

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

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

2.3 Gene Interactions: Incomplete dominance, codominance, Pleiotropy

2.4 Gene Interactions: Lethal alleles, Epistasis, Non- Epistasis

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

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

UNIT-III:

3.1 Polygenes (General Characteristics & examples)

3.2 Multiple Alleles (General Characteristics and Blood group inheritance)

3.3 Rh inheritance erythroblastosis foetalis

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

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

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

UNIT-IV:

1.1 Sex determination- Chromosomal theory and Genic Balance theory

1.2 Sex determination- Hormonal, Environmental and Haplo-diploidy types

1.3 Sex linked inheritance: X-linked inheritance

1.4 Sex linked inheritance: Y-linked & XY-linked inheritance

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

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

UNIT-V:

5.1 Human karyotyping, Pedigree Analysis(basics)

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

5.3 Autosomal Dominant disorder- Huntington disease

5.4 Basics on Genomics and Proteomic

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

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

CO-CURRICULAR ACTIVITIES:

- Observation of Mendelian / Non-Mendelian inheritance in the plants of college botanical garden or local village as a student study project activity
- Observation of blood group inheritance in students, from their parents and grandparents
- Karyotyping and preparation of pedigree charts for identifying diseases in family history
- Charts on chromosomal disorders

REFERENCE BOOKS:

- Harper, P. (2010). Practical genetic counselling. CRC Press.
- Kessler, S. (Ed.). (2013). Genetic counselling: psychological dimensions. Academic Press. 3.
- Stevenson, A. C., & Davison, B. C. (2016). Genetic counselling. Elsevier.
- Evans, C. (2006). Genetic counselling: a psychological approach. Cambridge University Press.
- Atlas of Inherited Metabolic Diseases
- Mendelian Inheritance in Man: A Catalog of Human Genes and Genetic Disorders, Victor A.
- McKusick, Vol I & II
- Stacy L Blachford (Editor) 2001. The Gale Encyclopedia of Genetic Disorders. Gale Group
- Publishers, Vol.1 (A-L), Vol.II (M-Z).

- Limoine, W.R. and Cooper, D.NB. 1996: Gene Trophy, Bios Scientific Pub.Oxford.
- Gardner, E.J., Simmons, M.J., Snustad, D.P. (2008). Principles of Genetics. VIII Edition. Wiley India
- Snustad, D.P., Simmons, M.J. (2009). Principles of Genetics. V Edition. John Wiley and Sons Inc.
- Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics. X Edition. Benjamin Cummings.
- Russell, P. J. (2009). Genetics- A Molecular Approach. III Edition. Benjamin Cummings.
- Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B. Introduction to Genetic Analysis. IX Edition. W. H. Freeman and Co.
- James D. Watson, Nancy H. Hopkins 'Molecular Biology of the Gene'
- Gupta P.K., 'Genetics

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

B.Sc. (Honours) - Zoology

Semester –III Syllabus:: 2026-27

COURSE 5: GENETICS

Curriculum: 2025-28 (R25)

Version: 2.0

Theory

Paper code: 25ZOO305T

Credits: 3

3 hrs/week

SYLLABUS

UNIT-I:

- 1.1 History of Genetics- Concepts of Phenotype, Genotype, Heredity, Variation, Pure lines and Inbred Lines
- 1.2 Mendelian Principles on Monohybrid cross,
- 1.3 Back cross and Test cross
- 1.4 Mendelian Principles on Dihybrid cross

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

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

UNIT-II:

- 2.1 Linkage - Definition, Types of linkage-complete linkage and incomplete linkage,Significance of linkage.
- 2.2 Crossing over - definition; Mechanism of crossing over: Chiasma Interference and coincidence
- 2.3 Gene Interactions: Incomplete dominance, codominance, Pleiotropy
- 2.4 Gene Interactions: Lethal alleles, Epistasis, Non- Epistasis

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

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

UNIT-III:

3.1 Polygenes (General Characteristics & examples)

3.2 Multiple Alleles (General Characteristics and Blood group inheritance)

3.3 Rh inheritance erythroblastosis foetalis

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

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

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

UNIT-IV:

4.1 Sex determination- Chromosomal theory and Genic Balance theory

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

4.3 Sex linked inheritance: X-linked inheritance

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

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

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

UNIT-V:

5.1 Human karyotyping, Pedigree Analysis(basics)

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

5.3 Autosomal Dominant disorder- Huntington disease

5.4 Basics on Genomics and Proteomic

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

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

CO-CURRICULAR ACTIVITIES:

- Observation of Mendelian / Non-Mendelian inheritance in the plants of college botanical garden or local village as a student study project activity
- Observation of blood group inheritance in students, from their parents and grandparents
- Karyotyping and preparation of pedigree charts for identifying diseases in family history
- Charts on chromosomal disorders

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

B.Sc. (Honours)- Zoology

Semester –III Syllabus -2026-27

COURSE 5: GENETICS

Curriculum: 2025-28 [R25]

Version: 2.0

(FOR II YEAR- THEORY PAPER)

Time: 3hours

Max marks: 70

S.N O	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. S Govt. Degree College for Women(A), Chittoor
B. Sc (Honours) - ZOOLOGY
SEMESTER-III:: COURSE 5: GENETICS
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. S Govt. Degree College for Women (A), Chittoor

B.Sc. (Honours) -Zoology

Model Question Paper

SEMESTER-III COURSE 5: GENETICS

Time:3hr

Paper Code: 25ZOO305T

Marks:70

SECTION- A

I. Answer any FIVE of the following questions Each question carries FOUR marks only. $5 \times 4 = 20$

1. Define phenotype and genotype with suitable examples
2. Differentiate between back cross and test cross with suitable examples.
3. Define linkage. Distinguish between complete linkage and incomplete linkage.
4. Write short notes on pleiotropy with suitable examples.
5. What are polygenes? Mention their general characteristics with examples.
6. Explain the erythroblastosis fetalis
7. Write short notes on the Chromosomal Theory of Sex Determination.
8. Explain the Y-linked inheritance.
9. What is pedigree analysis? Mention its significance in human genetics.
10. Write short notes on the Karyotyping

SECTION- B

II. Answer any FIVE of the following questions: $5 \times 10 = 50$

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

11. a) Explain Mendel's Monohybrid Cross and state the Law of Segregation with suitable diagrams.

OR

b) Describe Mendel's Dihybrid Cross and explain the Law of Independent Assortment with suitable diagrams.

12. a) Define crossing over and explain its mechanism. Add notes on chiasma formation, interference and coincidence.

OR

b) Explain gene interactions with suitable examples of incomplete dominance, lethal alleles, epistasis

13. a) Explain the concept of multiple alleles and describe the inheritance of ABO blood groups.

OR

b) Describe extra-chromosomal inheritance with reference to Kappa particles in *Paramecium* and shell coiling in snails.

14. a) Describe the various methods of sex determination with special reference to the Genic Balance Theory, Haplo-diploidy types.

OR

b) Explain sex-linked inheritance with suitable examples of X-linked and XY-linked inheritance.

15. a) Explain the causes, inheritance pattern, diagnosis, treatment and prevention of sickle cell anaemia.

OR

b) Describe Huntington disease with reference to its causes, inheritance pattern and clinical features.

APSCHE

SEMESTER-III

COURSE 5: GENETICS

Practicals

Paper code:

Credits: 1

2 hrs/week

COURSE OBJECTIVES:

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

SYLLABUS:

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

REFERENCE WEB LINKS:

- <https://www.iitg.ac.in/cseweb/vlab/anthropology/Experiments/Mendels%20law/index.html>
- <https://learn.genetics.utah.edu/content/labs/>
- https://virtuallabs.merlot.org/vl_biology.html
- <https://blog.praxilabs.com/2020/06/30/dna-extraction-virtual-lab/>
- <https://jru.edu.in/studentcorner/lab-manual/agriculture/Fundamentals%20of%20Genetics.pdf>
- https://academicworks.cuny.edu/cgi/viewcontent.cgi?article=1008&context=ny_oers

□ <https://sjce.ac.in/wp-content/uploads/2018/04/Cell-Biology-Genetics-Laboratory-Manual-17-18.pdf>

□

<https://www.rlbcau.ac.in/pdf/Agriculture/AGP%20113%20%20Fundamentals%20of%20Genetics.pdf>

□ https://coabnau.in/uploads/1610707528_GPB3.2PracticalManual-Final.pdf

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

B.Sc. (Honours) - Zoology

Semester –III Syllabus: 2026-27

COURSE 5: GENETICS

CURRICULUM: 2025-28 (R25)

Version: 2.0

Practicals

Paper code: 25ZOO305P

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2 hrs/week

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REFERENCE WEB LINKS:

- <https://www.iitg.ac.in/cseweb/vlab/anthropology/Experiments/Mendels%20law/index.html>
- <https://learn.genetics.utah.edu/content/labs/>
- https://virtuallabs.merlot.org/vl_biology.html
- <https://blog.praxilabs.com/2020/06/30/dna-extraction-virtual-lab/>
- <https://jru.edu.in/studentcorner/lab-manual/agriculture/Fundamentals%20of%20Genetics.pdf>
- https://academicworks.cuny.edu/cgi/viewcontent.cgi?article=1008&context=ny_oers

- <https://sjce.ac.in/wp-content/uploads/2018/04/Cell-Biology-Genetics-Laboratory-Manual-17-18.pdf>
- <https://www.rlbcau.ac.in/pdf/Agriculture/AGP%20113%20%20Fundamentals%20of%20Genetics.pdf>
- https://coabnau.in/uploads/1610707528_GPB3.2PracticalManual-Final.pdf

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

B.Sc. (Honours) - Zoology

Practical-Model Question Paper (wef : 2025-26)

SEMESTER-III: COURSE 5: Genetics

Paper code: 25ZOO305P

Time:3hr

Marks:50

S.No	Question	Marks
1	Major Experiment	1 x 20 = 20
2.	Minor Experiments	2 x 10 = 20
3	Record and Viva-voce	10M
	Total	50M

APSCHE

SEMESTER-III

COURSE 6: EVOLUTION AND ZOOGEOGRAPHY

Theory

Paper code:

Credits: 3

3 hrs/week

COURSE OBJECTIVES:

- To provide knowledge on origin of life, theories and forces of evolution
- To explore the evidences of evolution
- To Explain the theories of evolution
- To understand the role of variations and mutations in evolution of organisms
- To understand the zoogeographical distribution of animals

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 Evolution and zoo geography, by the completion of the course student will able to –

- Understand the principles and forces of evolution of life on earth, the process of evolution of new species and apply the same to develop new and advanced varieties of animals
- Explain the different evidences of evolution
- Understand the theories of evolution
- Explain the various tools for evolution
- Map the distribution of animals according to zoological realms

SYLLABUS:

UNIT-I

1.1 Origin of life: different ancient concepts -Origin of Earth and Solar system: Big Bang theory, Primitive atmosphere, formation of macromolecules

1.2 Biological evolution: Coacervates, Microspheres, formation of Nucleic acids, Nucleoproteins

1.3 Formation of primary organisms, evolution of modes of nutrition, oxygen revolution, present day atmosphere, evolution of eukaryotes.

1.4 Experimental evidences in support of Biochemical origin of life (Miller and Urey experiment)

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 Paleontological and taxonomical evidences of evolution

2.2 Morphological and anatomical evidences of evolution

2.3 Embryological and physiological evidences of evolution

2.4 Evidences from connecting links, missing links and bio geographical distribution

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/Visit to Archaeological Museum for observation of fossils

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

UNIT -III

3.1 Lamarckism-Neo Lamarckism

3.2 Germplasm theory-August Weismann

3.3 Darwinism-Theory of Natural selection

3.4 Modern synthetic theory of evolution (Neo Darwinism)

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-IV

4.1 Variations-types-sources of variations- importance in evolution

4.2 Mutations-classification-causes-significance in evolution

4.3 Isolation mechanisms-role in evolution

4.4 Sewall wright effect, Hardy Weinberg Principle

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-V

5.1 Animal distribution and barriers of distribution

5.2 Zoogeographical realms – Palearctic & Nearctic regions

5.3 Zoogeographical realms – Neotropical & Ethiopian regions

5.4 Zoogeographical realms – Oriental & Australian regions

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/Case study on the observation of fauna in the college locality/in the residential area

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

CO-CURRICULAR ACTIVITIES:

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

REFERENCES BOOKS:

- ❑ Ridley, M. (2004). Evolution. III Edition. Blackwell Publishing
- ❑ Hall, B. K. and Hallgrimsson, B. (2008). Evolution. IV Edition. Jones and Bartlett Publishers
- ❑ Douglas, J. Futuyma (1997). Evolutionary Biology. Sinauer Associates.
- ❑ Minkoff, E. (1983). Evolutionary Biology. Addison-Wesley.
- ❑ Organic evolution by Organic evolution by Dr. Veer Bala Rastogi, 2019 Kedar Nath Ramnath
- ❑ Palaeontology and Zoogeography Organic evolution by Dr. Veer Bala Rastogi, 2019 Kedarnath
- ❑ Ramnath Rastogi VB. 1991. *Organic Evolution*. Kedar Nath Ram Nath Publications, Meerut, Uttar Pradesh, India.
- ❑ Stahl FW. 1965. *Mechanics of Inheritance*. Prentice-Hall.
- ❑ White MJD. 1973. Animal Cytology and Evolution. Cambridge Univ. Press

Smt. N. P. S Govt. Degree College for Women (A), Chittoor
B.Sc. (Honours) - Zoology
Semester –III Syllabus:: 2026-27

COURSE 6: EVOLUTION AND ZOOGEOGRAPHY

Curriculum : 2025-28(R25)

Version : 2.0

Theory

Paper code: 25ZOO306T

Credits: 3

3 hrs/week

SYLLABUS:

UNIT-I

- 1.1 Origin of life: different ancient concepts -Origin of Earth and Solar system: Big Bang theory, Primitive atmosphere, formation of macromolecules
- 1.2 Biological evolution: Coacervates, Microspheres, formation of Nucleic acids, Nucleoproteins
- 1.3 Formation of primary organisms, evolution of modes of nutrition, oxygen revolution, present day atmosphere, evolution of eukaryotes.
- 1.4 Experimental evidences in support of Biochemical origin of life (Miller and Urey experiment)

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 Paleontological and taxonomical evidences of evolution
- 2.2 Morphological and anatomical evidences of evolution
- 2.3 Embryological and physiological evidences of evolution
- 2.4 Evidences from connecting links, missing links and bio geographical distribution

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/Visit to Archaeological Museum for observation of fossils

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

UNIT -III

- 3.1 Lamarckism-Neo Lamarckism
- 3.2 Germplasm theory-August Weismann

3.3 Darwinism-Theory of Natural selection

3.4 Modern synthetic theory of evolution (Neo Darwinism)

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-IV

4.1 Variations-types-sources of variations- importance in evolution

4.2 Mutations-classification-causes-significance in evolution

4.3 Isolation mechanisms-role in evolution

4.4 Sewall wright effect, Hardy Weinberg Principle

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-V

5.1 Animal distribution and barriers of distribution

5.2 Zoogeographical realms – Palearctic & Nearctic regions

5.3 Zoogeographical realms – Neotropical & Ethiopian regions

5.4 Zoogeographical realms – Oriental & Australian regions

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/Case study on the observation of fauna in the college locality/in the residential area

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

CO-CURRICULAR ACTIVITIES:

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

REFERENCES BOOKS:

- Ridley, M. (2004). *Evolution*. III Edition. Blackwell Publishing
- Hall, B. K. and Hallgrimsson, B. (2008). *Evolution*. IV Edition. Jones and Bartlett Publishers
- Douglas, J. Futuyma (1997). *Evolutionary Biology*. Sinauer Associates.
- Minkoff, E. (1983). *Evolutionary Biology*. Addison-Wesley.
- Organic evolution by Organic evolution by Dr. Veer Bala Rastogi, 2019 Kedar Nath Ramnath
- Palaeontology and Zoogeography Organic evolution by Dr. Veer Bala Rastogi, 2019 Kedarnath
- Ramnath Rastogi VB. 1991. *Organic Evolution*. Kedar Nath Ram Nath Publications, Meerut, Uttar Pradesh, India.
- Stahl FW. 1965. *Mechanics of Inheritance*. Prentice-Hall.
- White MJD. 1973. *Animal Cytology and Evolution*. Cambridge Univ. Press

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

B.Sc. (Honours) - Zoology

Semester –III Syllabus:: 2026-27

COURSE 6: EVOLUTION AND ZOOGEOGRAPHY

Curriculum: 2025-28(R25)

Version : 2.0

(FOR II 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. S Govt. Degree College for Women (A), Chittoor

B.Sc. (Honours) - Zoology

Semester –III Syllabus:: 2026-27

COURSE 6: EVOLUTION AND ZOOGEOGRAPHY

Curriculum : 2025-28(R25)

Version : 2.0

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. S Govt. Degree College for Women (A), Chittoor
B.Sc. (Honours) - Zoology
Semester –III:: 2026-27

COURSE 6: EVOLUTION AND ZOOGEOGRAPHY

Curriculum: 2025-28(R25)

Version : 2.0

Model Question Paper

Paper code: 25ZOO306T

Time:3hr

Marks:70

SECTION -A

I. Answer any FIVE of the following questions:

5 × 4 = 20

Each question carries FOUR marks only.

1. Write short notes on the **Big Bang Theory**.
2. Formation of Macromolecules
3. What are the **morphological and anatomical evidences** of evolution?
4. Write a short note on **connecting links**.
5. Describe the **Lamarckism**
6. Write a short note on the **Germplasm Theory**.
7. Define **mutation**. Mention its significance in evolution.
8. State the **Sewall Wright effect**.
9. What are the **barriers to animal distribution**?
10. Write a short note on the **Oriental Zoogeographical Realm**.

SECTION : B

II. Answer any FIVE of the following questions:

5 × 10 = 50

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

11. a) Explain the Miller and Urey experiment.

OR

b) Describe the origin of Earth and the evolution of the primitive atmosphere.

12. a) Explain the evidences of evolution from fossils and taxonomy.

OR

b) Describe the embryological, physiological evidences of evolution.

13. a) Explain **Darwin's Theory of Natural Selection**.

OR

b) Describe the **Neo-Lamarckism**.

14. A) Explain the **types, sources and importance of variations** in evolution.

OR

b) Describe **isolation mechanisms** and their role in evolution.

15. a) Describe the **Palearctic Zoogeographical Realm**.

OR

b) Explain the **Australian Zoogeographical Realms**.

APSCHE

SEMESTER-III

COURSE 6: EVOLUTION AND ZOOGEOGRAPHY

Practicals

Paper code:

Credits: 1

2 hrs/week

COURSE OBJECTIVES:

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

SYLLABUS:

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

REFERENCE WEB LINKS:

- <https://www.labster.com/course-packages/evolution-and-diversity>
- <https://www.biointeractive.org/classroom-resources/stickleback-evolution-virtual-lab>
- <https://www.youtube.com/watch?v=tXbmPhrS4eA>
- <https://www.studocu.com/en-us/document/temple-university/bioe-lab-2-biomaterials/1632834116536-zoogeography-assignment/17915777>
- <https://guides.library.tulsacc.edu/c.php?g=932434&p=6720765>
- https://bio.libretexts.org/Courses/Butte_College/BC%3A_BIOL_2_-

□

_Introduction_to_Human_Biology_%28Grewal%29/Text/09%3A_Biological_Evolution/9.3%3A_Evidence_for_Evolution

□ <https://www.coursehero.com/study-guides/boundless-biology/evidence-of-evolution/>

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

B.Sc. (Honours) - Zoology

Semester –III :: Syllabus :: 2026-27

COURSE 6: EVOLUTION AND ZOOGEOGRAPHY

Curriculum: 2025-28(R25)

Version : 2.0

Practicals

Paper code: 25ZOO306P

Credits: 1

2 hrs/week

COURSE OBJECTIVES:

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

SYLLABUS:

1. Study of fossil evidences
2. Study of homology and analogy from suitable specimens and pictures
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6. Study of connecting links/missing links images/charts
7. Phylogeny of horse with pictures
8. Study of Genetic Drift by using examples of Darwin's finches (pictures)
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10. Mapping distribution of animals according to zoogeographical regions.
11. Mapping zoogeographical regions

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- <https://www.labster.com/course-packages/evolution-and-diversity>
- <https://www.biointeractive.org/classroom-resources/stickleback-evolution-virtual-lab>
- <https://www.youtube.com/watch?v=tXbmPhrS4eA>
- <https://www.studocu.com/en-us/document/temple-university/bioe-lab-2-biomaterials/1632834116536-zoogeography-assignment/17915777>

- <https://guides.library.tulsacc.edu/c.php?g=932434&p=6720765>
- https://bio.libretexts.org/Courses/Butte_College/BC%3A_BIOL_2_-_Introduction_to_Human_Biology_%28Grewal%29/Text/09%3A_Biological_Evolution/9.3%3A_Evidence_for_Evolution
- <https://www.coursehero.com/study-guides/boundless-biology/evidence-of-evolution/>

Smt. N. P. S Govt. Degree College for Women (A), Chittoor
B.Sc. (Honours) - Zoology
Semester –III :: 2026-27

COURSE 6: EVOLUTION AND ZOOGEOGRAPHY

Curriculum: 2025-28(R25)

Version : 2.0

Practical-Model Question Paper

Paper Code: 25ZOO306P

Time : 3hr

Max. Marks: 50

S. No	Question	Marks
1	Major Experiment	1 x 20 = 20
2.	Minor Experiments	2 x 10 = 20
3	Record and Viva-voce	10M
	Total	50M

APSCHE

SEMESTER-III

COURSE 7: ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS

Theory

Paper code:

Credits: 3

3 hrs/week

COURSE OBJECTIVES:

- To acquire knowledge of organ systems function.
- To develop the ability to integrate physiology from the cellular and molecular level to the organ system and organismic level of organization.
- To effectively read, evaluate and communicate scientific information related to physiological processes in the body.
- To gain a deep knowledge of current topics in physiology.

LEARNING OUTCOMES:

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

- Understand the physiology of digestion and hormonal control of digestion
- Develop a comprehensive picture of respiratory physiology
- Acquire knowledge on the Renal physiology
- Understand the physiology of Nerve and muscle
- Understand the physiology of heart

SYLLABUS:

UNIT-I: Physiology of Digestion

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

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

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

UNIT-II: Physiology of Respiration

2.1 Structural organization of Respiratory system, Mechanism of respiration, Control of respiration

2.2 Pulmonary ventilation; Respiratory volumes and capacities;

2.3 Transport of oxygen in blood and dissociation curves and the factors influencing it

2.4 Transport of Carbon dioxide in blood; dissociation curves and the factors influencing it, Carbon monoxide poisoning

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

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

UNIT-III: Renal Physiology`

3.1 Structure of kidney and its functional UNIT

3.2 Mechanism of urine formation

3.3 Regulation of water balance

3.4 Regulation of acid-base balance

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above /Group discussion on the Urine formation/Working model of Kidney Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT-IV: Physiology of exciting tissues

4.1 Neuron structure and types

4.2 Nerve impulse transmission-(Myelinated, Non-myelinated, synaptic)

4.3 Ultra structure of muscle

4.4 Molecular and chemical basis of muscle contraction

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

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

UNIT- V: Physiology of Heart

5.1 Structure of mammalian heart, Coronary circulation;

5.2 Structure and working of conducting myocardial fibers. Origin and conduction of cardiac impulses

5.3 Cardiac Cycle-Cardiac output and its regulation

5.4 Nervous and chemical regulation of heart rate. Blood pressure and its regulation

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

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

CO-CURRICULAR ACTIVITIES:

- ❑ Chart on cardiac cycle, human lung, kidney/nephron structure etc.
- ❑ Working model of human / any mammalian heart.
- ❑ Working model of human / any mammalian urine formation
- ❑ Chart/model of sarcomere
- ❑ Chart/model on nerve impulse transmission

REFERENCES BOOKS:

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

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

B.Sc. (Honours) - Zoology

Semester –III Syllabus :: 2026-27

COURSE 7: ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS

Curriculum: 2025-28(R25)

Version : 2.0

Theory

Paper Code: 25ZOO307T

Credits: 3

3 hrs/week

COURSE OBJECTIVES:

- To acquire knowledge of organ systems function.
- To develop the ability to integrate physiology from the cellular and molecular level to the organ system and organismic level of organization.
- To effectively read, evaluate and communicate scientific information related to physiological processes in the body.
- To gain a deep knowledge of current topics in physiology.

LEARNING OUTCOMES:

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

- Understand the physiology of digestion and hormonal control of digestion
- Develop a comprehensive picture of respiratory physiology
- Acquire knowledge on the Renal physiology
- Understand the physiology of Nerve and muscle
- Understand the physiology of heart

SYLLABUS

UNIT-I: Physiology of Digestion

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

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

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

UNIT-II: Physiology of Respiration

2.1 Structural organization of Respiratory system, Mechanism of respiration, Control of respiration

2.2 Pulmonary ventilation; Respiratory volumes and capacities;

2.3 Transport of oxygen in blood and dissociation curves and the factors influencing it

2.4 Transport of Carbon dioxide in blood; dissociation curves and the factors influencing it, Carbon monoxide poisoning

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

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

UNIT-III: Renal Physiology`

3.1 Structure of kidney and its functional UNIT

3.2 Mechanism of urine formation

3.3 Regulation of water balance

3.4 Regulation of acid-base balance

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above /Group discussion on the Urine formation/Working model of Kidney Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT-IV: Physiology of exciting tissues

4.1 Neuron structure and types

4.2 Nerve impulse transmission-(Myelinated, Non-myelinated, synaptic)

4.3 Ultra structure of muscle

4.4 Molecular and chemical basis of muscle contraction

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

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

UNIT- V: Physiology of Heart

5.1 Structure of mammalian heart, Coronary circulation;

5.2 Structure and working of conducting myocardial fibers. Origin and conduction of cardiac impulses

5.3 Cardiac Cycle-Cardiac output and its regulation

5.4 Nervous and chemical regulation of heart rate. Blood pressure and its regulation

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

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

CO-CURRICULAR ACTIVITIES:

- ❑ Chart on cardiac cycle, human lung, kidney/nephron structure etc.
- ❑ Working model of human / any mammalian heart.
- ❑ Working model of human / any mammalian urine formation
- ❑ Chart/model of sarcomere
- ❑ Chart/model on nerve impulse transmission

REFERENCES BOOKS:

- ❑ Eckert H. *Animal Physiology: Mechanisms and Adaptation*. W.H. Freeman &Company.
- ❑ Flory E. *An Introduction to General and Comparative Animal Physiology*. W.B. Saunders Co., Philadelphia.
- ❑ Goel KA and Satish KV. 1989. *A Text Book of Animal Physiology*, Rastogi Publications, Meerut, U.P.
- ❑ Hoar WS. *General and Comparative Physiology*. Prentice Hall of India, New Delhi.

□ Lehninger AL. Nelson and Cox. *Principles of Biochemistry*. Lange Medical Publications, New Delhi.

□ Prosser CL and Brown FA. *Comparative Animal Physiology*. W.B. Saunders Company, Philadelphia.

Smt. N. P. S Govt. Degree College for Women (A), Chittoor
B.Sc. (Honours) - Zoology
Semester –III:: 2026-27

COURSE 7: ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS
(FOR II 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-III

COURSE 7: ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS

BLUE PRINT

UNIT	<u>SHORT ANSWER QUESTIONS</u>	<u>LONG ANSWER QUESTIONS</u>
I	<u>2</u>	<u>2</u>
II	<u>2</u>	<u>2</u>
III	<u>2</u>	<u>2</u>
IV	<u>2</u>	<u>2</u>
V	<u>2</u>	<u>2</u>
Total	<u>10</u>	<u>10</u>

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-III

COURSE 7: ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS

Paper code: 25ZOO307T

Time:3hr

Marks:70

I. Answer any FIVE of the following questions: $5 \times 4 = 20$

Each question carries FOUR marks only.

1. Write a short note on the structure of the gastrointestinal tract.
2. Explain the absorption of carbohydrates.
3. Define pulmonary ventilation. Mention its importance.
4. What are the respiratory volumes and capacities?
5. Describe the structure of a nephron.
6. Describe the regulation of water balance.
7. Describe the structure of a neuron.
8. Write a short note on synaptic transmission.
9. Describe the structure of the mammalian heart.
10. What is the cardiac cycle?

II. Answer any FIVE of the following questions: $5 \times 10 = 50$

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

11. a) Describe the structure and functions of the gastrointestinal tract.

OR

b) Explain the hormonal control of enzyme secretion in the gastrointestinal tract.

12. a) Explain the mechanism of respiration.

OR

b) Describe the transport of oxygen and carbon di oxide in blood.

13. a) Explain the mechanism of urine formation.

OR

b) Describe the regulation of acid-base balance.

14. a) Explain the transmission of nerve impulse in myelinated nerve fibres.

OR

b) Describe the molecular mechanism of muscle contraction.

15. a) Explain the origin and conduction of cardiac impulses.

OR

b) Describe the Nervous and chemical regulation of heart rate.

APSCHE

SEMESTER-III

COURSE 7: ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS

Practicals

Paper code:

Credits: 1

2 hrs/week

COURSE OBJECTIVES:

- To acquire knowledge of anatomy of certain important organs.
- To develop the ability to test the biological sample like saliva and urine.
- To Effectively estimate the blood hemoglobin.
- To Acquire skill to use the sphygmomanometer in recording blood pressure.
- To observe the ECG

SYLLABUS:

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

REFERENCE WEB LINKS:

- <https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham>
- <https://library.csi.cuny.edu/oer/virtuallabs-simulations#anatomy>
- <https://www.labster.com/simulations?course-packages=animal-physiology>
-

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

- [https://physiology.elte.hu/gyakorlat/jegyzet/Physiology_Pactical_\(2013\).pdf](https://physiology.elte.hu/gyakorlat/jegyzet/Physiology_Pactical_(2013).pdf)

Smt. N. P. S Govt. Degree College for Women (A), Chittoor
B.Sc. (Honours) - Zoology
Semester –III:: 2026-27

COURSE 7: ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS

Practicals

Paper code:25ZOO307P

Credits: 1

2 hrs/week

COURSE OBJECTIVES:

- ❑ To acquire knowledge of anatomy of certain important organs.
- ❑ To develop the ability to test the biological sample like saliva and urine.
- ❑ To Effectively estimate the blood hemoglobin.
- ❑ To Acquire skill to use the sphygmomanometer in recording blood pressure.
- ❑ To observe the ECG

SYLLABUS:

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

REFERENCE WEB LINKS:

- ❑ <https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham>
- ❑ <https://library.csi.cuny.edu/oer/virtuallabs-simulations#anatomy>
- ❑ <https://www.labster.com/simulations?course-packages=animal-physiology>

Smt. N. P. S Govt. Degree College for Women (A), Chittoor
B.Sc. (Honours) - Zoology
Semester –III:: 2026-27
COURSE 7: ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS
Practical-Model Question Paper

Paper code: 25ZOO307P

Time:3hr

Marks:50

S.No	Question	Marks
1	Major Experiment	1 x 20 = 20
2.	Minor Experiments	2 x 10 = 20
3	Record and Viva-voce	10M
	Total	50M

SEMESTER-IV

APSCHE

SEMESTER-IV

COURSE 8: IMMUNOLOGY

Theory

Paper code:

Credits: 3

3 hrs/week

COURSE OBJECTIVES:

- ❑ To promote critical thinking among students.
- ❑ To provide students with a foundation in immunological processes
- ❑ To provide students with knowledge on how the immune system works building on their previous knowledge
- ❑ To clearly state the role of the immune system.
- ❑ To compare and contrast the innate versus adaptive immune systems.
- ❑ To provide an overview of the interaction between the immune system and pathogens.

LEARNING OUTCOMES:

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

- ❑ Articulate the roles of innate recognition receptors in immune responses
- ❑ Compare and contrast humoral versus cell-mediated immune responses
- ❑ Distinguish various cell types involved in immune responses and associated functions;
- ❑ Distinguish and characterize antibody isotypes, development, and functions
- ❑ Understand the role of cytokines in immunity and immune cell activation;
- ❑ Understand the significance of the Major Histocompatibility Complex in terms of immune response and transplantation

SYLLABUS:

UNIT – I: Overview of Immune system

1.1 Introduction to basic concepts in Immunology

1.2 Innate and adaptive immunity

1.3 Cells of immune system

1.4 Organs of immune system

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

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

UNIT – II: Antigens

2.1 Basic properties of antigens

2.2 B and T cell epitopes, paratopes

2.3 Haptens and adjuvants

2.4 Factors influencing immunogenicity

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

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

UNIT – III: Antibodies

3.1 Structure of antibody

3.2 Classes of antibodies

3.3 Functions of antibodies

3.4 Monoclonal antibodies

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

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

UNIT – IV: Working of Immune system

4.1 Structure and functions of major histocompatibility complexes

4.2 Exogenous pathway of antigen presentation and processing

4.3 Endogenous pathway of antigen presentation and processing

4.4. Basic properties and functions of cytokines

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

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

UNIT – V: Immune system in health and disease

5.1 Gell and Coombs' classification and brief description of various types of hypersensitivities

5.2 Introduction to concepts of autoimmunity and immunodeficiency

5.3 General introduction to vaccines Types of vaccines, Immunization programme

5.4 Organ transplantation- Graft rejection, immune suppressors

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

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

CO-CURRICULAR ACTIVITIES:

- Organizing awareness on immunization importance in local village in association with NCC and NSS teams
- Charts on types of cells and organs of immune system
- Student study projects on aspects such as – identification of allergies among students (hypersensitivity), blood groups in the class (antigens and antibodies duly reported) etc., as per the creativity and vision of the lecturer and students

REFERENCES BOOKS:

- Judy Owen, Jenni Punt, Sharon Stranford 2013 Kuby Immunology: International Edition W. H. Freeman
- Delves P, Martin S, Burton D, Roitt IM 2011 Roitt's Essential Immunology. 12th Ed. Wiley-Blackwell Scientific Publication, Oxford.
- Murphy K, 2011 Janeway's Immunobiology. 8th Ed. Garland Science Publishers, New York.
- Peakman M, and Vergani D. (2009). Basic and Clinical Immunology. 2nd edition Churchill Livingstone Publishers, Edinberg.
- Richard Coico, Geoffrey Sunshine 2008 Immunology: A Short Course, 6th Edition Wiley-Blackwell
- Sudha Gangal 2013 Textbook of Basic and Clinical Immunology Orient Blackswan Private Limited New Delhi

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

B.Sc. (Honours) - Zoology

Semester –III Syllabus :: 2026-27

COURSE 8: IMMUNOLOGY

Curriculum: 2025-28(R25)

Version : 2.0

Theory

Paper code: 25ZOO408T

Credits: 3

3 hrs/week

COURSE OBJECTIVES:

- ❑ To promote critical thinking among students.
- ❑ To provide students with a foundation in immunological processes
- ❑ To provide students with knowledge on how the immune system works building on their previous knowledge
- ❑ To clearly state the role of the immune system.
- ❑ To compare and contrast the innate versus adaptive immune systems.
- ❑ To provide an overview of the interaction between the immune system and pathogens.

LEARNING OUTCOMES:

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

- ❑ Articulate the roles of innate recognition receptors in immune responses
- ❑ Compare and contrast humoral versus cell-mediated immune responses
- ❑ Distinguish various cell types involved in immune responses and associated functions;
- ❑ Distinguish and characterize antibody isotypes, development, and functions
- ❑ Understand the role of cytokines in immunity and immune cell activation;
- ❑ Understand the significance the Major Histocompatibility Complex in terms of immune response and transplantation

SYLLABUS:

UNIT – I: Overview of Immune system

1.1 Introduction to basic concepts in Immunology

1.2 Innate and adaptive immunity

1.3 Cells of immune system

1.4 Organs of immune system

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

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

UNIT – II: Antigens

2.1 Basic properties of antigens

2.2 B and T cell epitopes, paratopes

2.3 Haptens and adjuvants

2.4 Factors influencing immunogenicity

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

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

UNIT – III: Antibodies

3.1 Structure of antibody

3.2 Classes of antibodies

3.3 Functions of antibodies

3.4 Monoclonal antibodies

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

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

UNIT – IV: Working of Immune system

4.1 Structure and functions of major histocompatibility complexes

4.2 Exogenous pathway of antigen presentation and processing

4.3 Endogenous pathway of antigen presentation and processing

4.4. Basic properties and functions of cytokines

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

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

UNIT – V: Immune system in health and disease

5.1 Gell and Coombs' classification and brief description of various types of hypersensitivities

5.2 Introduction to concepts of autoimmunity and immunodeficiency

5.3 General introduction to vaccines Types of vaccines, Immunization programme

5.4 Organ transplantation- Graft rejection, immune suppressors

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

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

CO-CURRICULAR ACTIVITIES:

- Organizing awareness on immunization importance in local village in association with NCC and NSS teams
- Charts on types of cells and organs of immune system
- Student study projects on aspects such as – identification of allergies among students (hypersensitivity), blood groups in the class (antigens and antibodies duly reported) etc., as per the creativity and vision of the lecturer and students

REFERENCES BOOKS:

- Judy Owen, Jenni Punt, Sharon Stranford 2013 Kuby Immunology: International Edition W. H. Freeman
- Delves P, Martin S, Burton D, Roitt IM 2011 Roitt's Essential Immunology. 12th Ed. Wiley-Blackwell Scientific Publication, Oxford.
- Murphy K, 2011 Janeway's Immunobiology. 8th Ed. Garland Science Publishers, New York.
- Peakman M, and Vergani D. (2009). Basic and Clinical Immunology. 2nd edition Churchill Livingstone Publishers, Edinberg.
- Richard Coico, Geoffrey Sunshine 2008 Immunology: A Short Course, 6th Edition Wiley-Blackwell
- Sudha Gangal 2013 Textbook of Basic and Clinical Immunology Orient Blackswan Private Limited New Delhi

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

B.Sc. (Honours) - Zoology

Semester –IV:: 2026-27

COURSE 8: IMMUNOLOGY

(FOR II 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**

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B.Sc. (Honours) - Zoology

Semester –IV :: 2026-27

COURSE 8: IMMUNOLOGY

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. S Govt. Degree College for Women (A), Chittoor
B.Sc. (Honours) - Zoology
Semester –IV :: 2026-27
COURSE 8: IMMUNOLOGY
Model Question Paper

Paper code: 25ZOO408T

Time:3hr

Marks:70

I. Answer any FIVE of the following questions: $5 \times 4 = 20$

Each question carries FOUR marks only.

1. Define immunology. Write the basic concepts of the immune system.
2. Differentiate between innate immunity and adaptive immunity.
3. Define B and T cell epitopes
4. Write a short note on haptens.
5. Describe the structure of an antibody.
6. Mono clonal antibodies.
7. Write a short note on the Major Histocompatibility Complex (MHC).
8. What are cytokines? Mention their functions.
9. Write a short notes on Autoimmunity
10. Describe the graft rejection mechanism.

II. Answer any FIVE of the following questions: $5 \times 10 = 50$

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

11. a) Describe the cells of the immune system.

OR

b) Explain the innate immunity and adaptive immunity with suitable examples

12. a) Explain the basic properties of antigens.

OR

b) Describe the factors influencing immunogenicity.

13. a) Explain the Classes of antibodies

OR

b) Describe the functions of antibodies.

14. a) Explain the exogenous pathway of antigen processing and presentation.

OR

b) Explain the endogenous pathway of antigen processing and presentation.

15. a) Describe the types of vaccines and the immunization programme.

OR

b) Describe the Gell and Coombs' classification and brief description of various types of hypersensitivities

APSCHE

SEMESTER-IV

COURSE 8: Immunology

Practicals

Paper code:

Credits: 1

2 hrs/week

COURSE OBJECTIVES:

- To acquire knowledge on the distribution of lymphoid organs
- To study the histology of lymphoid organs
- To acquaint with the process of blood grouping with kit
- To acquaint with the ELISA test
- To acquaint with the Widal test

SYLLABUS:

1. Demonstration of lymphoid organs (as per UGC guidelines)
2. Histological study of spleen, thymus and lymph nodes (through prepared slides)
3. Blood group determination
4. Demonstration of ELISA
5. Demonstration of Immuno-electrophoresis
6. Testing for Typhoid antigens by Widal test.
7. Differential Leukocyte Count
8. Isolation of monocytes from blood.
9. Rapid Plasma Reagin (RPR) Test

REFERENCE WEB LINKS:

- <https://vlab.amrita.edu/?sub=3&brch=69>
- <https://ivl1-au.vlabs.ac.in/List%20of%20experiments.html>
- <https://ivl2-au.vlabs.ac.in/List%20of%20experiments.html>
- <https://www.medicine.mcgill.ca/physio/vlab/immun/vlabmenuimmun.htm>

□

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

□ <http://www.lucp.net/books-pdf/Lab%20Manual%20Dr.%20Idris%20Adewale%20Ahmed/15.%20BASIC%20IMMUNOLOGY.pdf>

□

https://www.avit.ac.in/lab/immunology_bioprocess_engineering_lab/download/17BTCC89/lab_manual.pdf

□ <https://www.urmc.rochester.edu/MediaLibraries/URMCMedia/labs/frelinger-lab/documents/Immunology-Lab-Manual.pdf>

□ https://webstor.srmist.edu.in/web_assets/downloads/2021/18BTC106J-lab-manual.pdf

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

B.Sc. (Honours) - Zoology

Semester –IV :: Syllabus :: 2026-27

COURSE 8: IMMUNOLOGY

Practicals

Paper code:25ZOO408P

Credits: 1

2 hrs/week

COURSE OBJECTIVES:

- To acquire knowledge on the distribution of lymphoid organs
- To study the histology of lymphoid organs
- To acquaint with the process of blood grouping with kit
- To acquaint with the ELISA test
- To acquaint with the Widal test

SYLLABUS:

1. Demonstration of lymphoid organs (as per UGC guidelines)
2. Histological study of spleen, thymus and lymph nodes (through prepared slides)
3. Blood group determination
4. Demonstration of ELISA
5. Demonstration of Immunoelectrophoresis
6. Testing for Typhoid antigens by Widal test.
7. Differential Leukocyte Count
8. Isolation of monocytes from blood.
9. Rapid Plasma Reagin (RPR) Test

REFERENCE WEB LINKS:

- <https://vlab.amrita.edu/?sub=3&brch=69>
- <https://ivl1-au.vlabs.ac.in/List%20of%20experiments.html>
- <https://ivl2-au.vlabs.ac.in/List%20of%20experiments.html>
- <https://www.medicine.mcgill.ca/physio/vlab/immun/vlabmenuimmun.htm>

□

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

□ <http://www.lucp.net/books-pdf/Lab%20Manual%20Dr.%20Idris%20Adewale%20Ahmed/15.%20BASIC%20IMMUNOLOGY.pdf>

□

https://www.avit.ac.in/lab/immunology_bioprocess_engineering_lab/download/17BTCC89/lab_manual.pdf

□ <https://www.urmc.rochester.edu/MediaLibraries/URMCMedia/labs/frelinger-lab/documents/Immunology-Lab-Manual.pdf>

□ https://webstor.srmist.edu.in/web_assets/downloads/2021/18BTC106J-lab-manual.pdf

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B.Sc. (Honours) - Zoology

Semester –IV:: 2026-27

COURSE 8: IMMUNOLOGY

Practical-Model Question Paper

Paper code: 25ZOO408P

Time:3hr

Marks:50

S.No	Question	Marks
1	Major Experiment	1 x 20 = 20
2.	Minor Experiment	1 x 10 = 10
3	Slides/Specimens/Images/Charts any Two	2 x 5 = 10
4	Record and Viva-voce	10M
	Total	50M

APSCHE

SEMESTER-IV

COURSE 9: ANIMAL BIOTECHNOLOGY

Theory

Paper code:

Credits: 3

3 hrs/week

COURSE OBJECTIVES:

- ▣ To provide knowledge on animal cell and tissue culture and their preservation
- ▣ To empower students with latest biotechnology techniques like stem cell technology, genetic engineering, hybridoma technology, transgenic technology and their application in medicine and industry for the benefit of living organisms
- ▣ To explain *in vitro* fertilization, embryo transfer technology and other reproduction manipulation methodologies.
- ▣ To get insight in applications or recombinant DNA technology in agriculture, production of therapeutic proteins.
- ▣ To understand principles of animal culture, media preparation.

LEARNING OUTCOMES:

This course will provide students with a deep knowledge in animal biotechnology, by the completion of the course student will be able to –

- ▣ Get knowledge of the Vectors and Restriction enzymes used in biotechnology
- ▣ Describe the gene delivery mechanism and PCR technique
- ▣ Acquire basic knowledge on media preparation and cell culture techniques
- ▣ Understand the manipulation of reproduction with the application of biotechnology
- ▣ Understand the applications of Biotechnology in the fields of industry and agriculture including animal cell/tissue culture, stem cell technology and genetic engineering.

SYLLABUS:

UNIT-I:

1.1 Enzymes and Vectors Restriction modification systems: Types I, II and III.

1.2 Mode of action, nomenclature, applications of Type II restriction enzymes in genetic engineering

1.3 DNA modifying enzymes and their applications: DNA polymerases. Terminal deoxynucleotidyl transferase, kinases and phosphatases, and DNA ligases

1.4 Cloning Vectors: Plasmid vectors: pBR and pUC series, Bacteriophage lambda and M13 based vectors, Cosmids, BACs, YACs,

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

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

UNIT- II:

2.1 Gene delivery: Microinjection, electroporation, biolistic method (gene gun), liposome and viral mediated delivery

2.2 PCR: Basics of PCR.

2.3 DNA Sequencing: Sanger's method of DNA sequencing- traditional and automated sequencing

2.4 Hybridization techniques: Southern, Northern and Western blotting

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

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

UNIT-III:

3.1 Natural and Synthetic Cell cultures: primary culture, secondary culture, continuous cell lines

3.2 Organ culture; Cryopreservation of cultures.

3.3 Hybridoma Technology: Cell fusion, Production of Monoclonal antibodies (mAb), Applications of mAb

3.4 Stem cells: Types of stem cells, applications

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

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

UNIT-IV:

4.1 Manipulation of reproduction in animals: Artificial Insemination, In vitro fertilization

4.2 Manipulation of reproduction in animals: Super ovulation, Embryo transfer, Embryo cloning

4.3 Transgenic Animals: Strategies of Gene transfer;

4.4 Transgenic - sheep, - fish; applications

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

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

UNIT-V:

5.1 DNA fingerprinting

5.2 Application of biotechnology in fisheries – monoculture in fishes, polyploidy in fishes

5.3 Gene therapy-application

5.4 Bio informatics- concept-definition-database types

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

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

REFERENCES BOOKS:

□ Brown TA. (2010). Gene Cloning and DNA Analysis. 6th edition. Blackwell Publishing, Oxford, U.K.

□ Clark DP and Pazdernik NJ. (2009). Biotechnology: Applying the Genetic Revolution. Elsevier

□ Academic Press, USA

□ Primrose SB and Twyman RM. (2006). Principles of Gene Manipulation and Genomics, 7th edition. Blackwell Publishing, Oxford, U.K.

□ Sambrook J and Russell D. (2001). Molecular Cloning-A Laboratory Manual. 3rd edition.
Cold

Spring Harbor Laboratory Press

□ Wiley JM, Sherwood LM and Woolverton CJ. (2008). Prescott, Harley and Klein's
Microbiology. McGraw Hill Higher Education

□ Brown TA. (2007). Genomes-3. Garland Science Publishers

□ Primrose SB and Twyman RM. (2008). Genomics: Applications in human biology. Blackwell

Publishing, Oxford, U.K.

□ Animal Cells Culture and Media, D.C. Darling and S.J. Morgan, 1994.BIOS Scientific
Publishers

Limited.

□ Methods in Cell Biology, Volume 57, Jennie P. Mathur and David Barnes, 1998.

□ Animal Cell Culture Methods Academic Press.

□ P.K. Gupta: Biotechnology and Genomics, Rastogi publishers (2003).

□ B.D. Singh: Biotechnology, Kalyani publishers, 1998 (Reprint 2001)

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

B.Sc. (Honours) - Zoology

Semester –IV:: Syllabus :: 2026-27

COURSE 9: ANIMAL BIOTECHNOLOGY

CURRICULUM : 2025-28(R25)

VERSION: 2.0

Theory

Paper code:25ZOO409T

Credits: 3

3 hrs/week

COURSE OBJECTIVES:

- ❑ To provide knowledge on animal cell and tissue culture and their preservation
- ❑ To empower students with latest biotechnology techniques like stem cell technology, genetic engineering, hybridoma technology, transgenic technology and their application in medicine and industry for the benefit of living organisms
- ❑ To explain *in vitro* fertilization, embryo transfer technology and other reproduction manipulation methodologies.
- ❑ To get insight in applications or recombinant DNA technology in agriculture, production of therapeutic proteins.
- ❑ To understand principles of animal culture, media preparation.

LEARNING OUTCOMES:

This course will provide students with a deep knowledge in animal biotechnology, by the completion of the course student will able to –

- ❑ Get knowledge of the Vectors and Restriction enzymes used in biotechnology
- ❑ Describe the gene delivery mechanism and PCR technique
- ❑ Acquire basic knowledge on media preparation and cell culture techniques
- ❑ Understand the manipulation of reproduction with the application of biotechnology
- ❑ Understand the applications of Biotechnology in the fields of industry and agriculture including animal cell/tissue culture, stem cell technology and genetic engineering.

SYLLABUS:

UNIT-I:

1.1 Enzymes and Vectors Restriction modification systems: Types I, II and III.

1.2 Mode of action, nomenclature, applications of Type II restriction enzymes in genetic engineering

1.3 DNA modifying enzymes and their applications: DNA polymerases. Terminal deoxynucleotidyl transferase, kinases and phosphatases, and DNA ligases

1.4 Cloning Vectors: Plasmid vectors: pBR and pUC series, Bacteriophage lambda and M13 based vectors, Cosmids, BACs, YACs,

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

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

UNIT- II:

2.1 Gene delivery: Microinjection, electroporation, biolistic method (gene gun), liposome and viral mediated delivery

2.2 PCR: Basics of PCR.

2.3 DNA Sequencing: Sanger's method of DNA sequencing- traditional and automated sequencing

2.4 Hybridization techniques: Southern, Northern and Western blotting

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

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

UNIT-III:

3.1 Natural and Synthetic Cell cultures: primary culture, secondary culture, continuous cell lines

3.2 Organ culture; Cryopreservation of cultures.

3.3 Hybridoma Technology: Cell fusion, Production of Monoclonal antibodies (mAb), Applications of mAb

3.4 Stem cells: Types of stem cells, applications

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

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

UNIT-IV:

4.1 Manipulation of reproduction in animals: Artificial Insemination, In vitro fertilization

4.2 Manipulation of reproduction in animals: Super ovulation, Embryo transfer, Embryo cloning

4.3 Transgenic Animals: Strategies of Gene transfer;

4.4 Transgenic - sheep, - fish; applications

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

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

UNIT-V:

5.1 DNA fingerprinting

5.2 Application of biotechnology in fisheries – monoculture in fishes, polyploidy in fishes

5.3 Gene therapy-application

5.4 Bio informatics- concept-definition-database types

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

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

REFERENCES BOOKS:

□ Brown TA. (2010). Gene Cloning and DNA Analysis. 6th edition. Blackwell Publishing, Oxford, U.K.

□ Clark DP and Pazdernik NJ. (2009). Biotechnology: Applying the Genetic Revolution. Elsevier

□ Academic Press, USA

□ Primrose SB and Twyman RM. (2006). Principles of Gene Manipulation and Genomics, 7th edition. Blackwell Publishing, Oxford, U.K.

□ Sambrook J and Russell D. (2001). Molecular Cloning-A Laboratory Manual. 3rd edition. Cold

Spring Harbor Laboratory Press

□ Wiley JM, Sherwood LM and Woolverton CJ. (2008). Prescott, Harley and Klein's Microbiology. McGraw Hill Higher Education

□ Brown TA. (2007). Genomes-3. Garland Science Publishers

□ Primrose SB and Twyman RM. (2008). Genomics: Applications in human biology. Blackwell

Publishing, Oxford, U.K.

□ Animal Cells Culture and Media, D.C. Darling and S.J. Morgan, 1994. BIOS Scientific Publishers

Limited.

□ Methods in Cell Biology, Volume 57, Jennie P. Mathur and David Barnes, 1998.

□ Animal Cell Culture Methods Academic Press.

□ P.K. Gupta: Biotechnology and Genomics, Rastogi publishers (2003).

□ B.D. Singh: Biotechnology, Kalyani publishers, 1998 (Reprint 2001)

Smt. N. P. S Govt. Degree College for Women (A), Chittoor
B.Sc. (Honours) - Zoology
Semester –IV:: 2026-27

COURSE 9: ANIMAL BIOTECHNOLOGY
(FOR II 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**

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B.Sc. (Honours) - Zoology
Semester –IV:: 2026-27

COURSE 9: ANIMAL BIOTECHNOLOGY
BLUE PRINT

<u>UNIT</u>	<u>SHORT ANSWER QUESTIONS</u>	<u>LONG ANSWER QUESTIONS</u>
<u>I</u>	<u>2</u>	<u>2</u>
<u>II</u>	<u>2</u>	<u>2</u>
<u>III</u>	<u>2</u>	<u>2</u>
<u>IV</u>	<u>2</u>	<u>2</u>
<u>V</u>	<u>2</u>	<u>2</u>
<u>Total</u>	<u>10</u>	<u>10</u>

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B.Sc. (Honours) - Zoology
Semester –IV:: 2026-27

COURSE 9: ANIMAL BIOTECHNOLOGY

Model Question Paper

Paper code: 25ZOO409T

Time:3hr

Marks:70

I. Answer any FIVE of the following questions: $5 \times 4 = 20$

Each question carries FOUR marks only.

1. Write a short note on Type II restriction enzymes.
2. What are plasmid vectors? Give examples.
3. Write a short note on microinjection.
4. Explain the basic principle of PCR.
5. Differentiate between primary cell culture and continuous cell line.
6. Write a short note on stem cells.
7. What is artificial insemination?
8. Write a short note on transgenic animals.
9. What is DNA fingerprinting?
10. Define bioinformatics. Mention the types of databases.

II. Answer any FIVE of the following questions: $5 \times 10 = 50$

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

11. a) Explain the DNA modifying enzymes and their applications

OR

b) Describe the cloning vectors used in genetic engineering.

12. a) Explain the Southern blotting technique

OR

b) Describe Sanger's method of DNA sequencing.

13. a) Explain the production of monoclonal antibodies by Hybridoma technology.

OR

b) Describe the primary culture, secondary culture, continuous cell lines

14. a) Explain the techniques of in vitro fertilization.

OR

b) Describe the transgenic animals.

15. a) Explain the Process and applications of DNA fingerprinting.

OR

b) Describe the gene therapy and its applications

APSCHE

SEMESTER-IV

COURSE 9: ANIMAL BIOTECHNOLOGY

Practicals

Paper code:

Credits: 1

2 hrs/week

COURSE OBJECTIVES:

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

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

SYLLABUS:

1. Cloning Vectors: Plasmid vectors: pBR and pUC series, Bacteriophage lambda and M13 based vectors, Cosmids, BACs, YACs, (Charts/Images/Models)
2. DNA quantification using DPA Method.
3. Techniques: DNA Fingerprinting
4. Separation, Purification of biological compounds by paper chromatography
5. Cleaning and sterilization of glass and plastic wares for cell culture.
6. Preparation of culture media.
7. Amplification of DNA by PCR

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

REFERENCE WEB LINKS:

- <https://vlab.amrita.edu/>
- <https://www.vlab.co.in/broad-area-biotechnology-and-biomedical-engineering>
- <https://blog.praxilabs.com/2020/06/30/dna-extraction-virtual-lab/>
- <http://mbvi-au.vlabs.ac.in/>
- https://webstor.srmist.edu.in/web_assets/downloads/2021/18BTC203J-lab-manual.pdf
- https://webstor.srmist.edu.in/web_assets/srm_mainsite/files/files/BT%200312%20-

□ %20ANIMAL%20CELL%20AND%20TISSUE%20CULTURE%20LABORATORY.pdf

□

<https://davjalandhar.com/dbt/biotechnology/SOP/BSc%20Biotechnology%20Semester%20V%20>

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□ %26%20VI.pdf

□

https://www.austincc.edu/awheeler/Files/BIOL%201414%20Fall%202011/BIOL1414_Lab%20

□ Manual_Fall%202011.pdf

Smt. N. P. S Govt. Degree College for Women (A), Chittoor
B.Sc. (Honours) - Zoology
Semester –IV:: Syllabus :: 2026-27
COURSE 9: ANIMAL BIOTECHNOLOGY

Practicals

Paper code:25ZOO409P

Credits: 1

2 hrs/week

COURSE OBJECTIVES:

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

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

SYLLABUS:

1. Cloning Vectors: Plasmid vectors: pBR and pUC series, Bacteriophage lambda and M13 based vectors, Cosmids, BACs, YACs, (Charts/Images/Models)
2. DNA quantification using DPA Method.
3. Techniques: DNA Fingerprinting
4. Separation, Purification of biological compounds by paper chromatography
5. Cleaning and sterilization of glass and plastic wares for cell culture.
6. Preparation of culture media.
7. Amplification of DNA by PCR

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

REFERENCE WEB LINKS:

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

<https://davjalandhar.com/dbt/biotechnology/SOP/BSc%20Biotechnology%20Semester%20V%20%26%20VI.pdf>

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□ %26%20VI.pdf

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https://www.austincc.edu/awheeler/Files/BIOL%201414%20Fall%202011/BIOL1414_Lab%20Manual_Fall%202011.pdf

□ Manual_Fall%202011.pdf

Smt. N. P. S Govt. Degree College for Women (A), Chittoor
B.Sc. (Honours) - Zoology
Semester –IV:: 2026-27

COURSE 9: ANIMAL BIOTECHNOLOGY

Practical-Model Question Paper

Paper code: 25ZOO409P

Time:3hr

Marks:50

S.No	Question	Marks
1	Major Experiment	1 x 20 = 20
2.	Minor Experiment	1 x 10 = 10
3	Slides/Specimens/Images/Charts any Two (Cloning Vectors)	2 x 5 = 10
4	Record and Viva-voce	10M
	Total	50M

APSCHE

SEMESTER-IV

COURSE 10: WILDLIFE AND CONSERVATION BIOLOGY

Theory

Paper code:

Credits: 3

3 hrs/week

COURSE OBJECTIVES:

- ▣ To Grasp the principles of wildlife ecology, identify key threats to wildlife in India, and evaluate conservation approaches.
- ▣ To Recognize the importance and types of protected areas (National Parks, Sanctuaries, Biosphere Reserves) and their components in habitat conservation.
- ▣ To Apply wildlife management strategies and legislation to protect and manage endangered species and their habitats.
- ▣ To Examine the complexities of human-wildlife interactions and propose effective mitigation strategies.
- ▣ To Discuss national and international conservation initiatives, including conventions (CITES, IUCN, CBD, Ramsar) and their role in biodiversity protection.

LEARNING OUTCOMES:

This course will provide students with a deep knowledge in acquiring laboratory skills, by completion of the course the graduate shall able to –

- ▣ Know the Concept of wildlife and reasons for their depletion
- ▣ Know the wild life management strategies
- ▣ Know the Importance of ecologically sensitive areas
- ▣ Know the human Impact on environmental resources
- ▣ Understand the human wildlife interaction

SYLLABUS:

UNIT I

1.1 Wildlife wealth of India & threatened wildlife.

1.2 Reasons for wildlife depletion in India. Wildlife conservation approaches and limitations.

1.3 National Parks, Sanctuaries and Biosphere Reserves, cores and Buffers, Nodes and corridors.
Community Reserve and conservation Reserves

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

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

UNIT II

2.1 Red Data Book and Conservation status (endangered, vulnerable, rare, threatened and near threatened species)-definitions.

2.2 Wild life Trade & legislation- Assessment, documentation, Prevention of trade

2.3 Policies and laws in Wild life management (national) and ethics.

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

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

UNIT III

3.1 Biodiversity extinction and conservation approaches- Identification and prioritization of Ecologically sensitive area (ESA).

3.2 Regional and National approaches for biodiversity conservation.

3.3 Population viability analysis-conceptual foundation, uses of PVA models.

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

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

UNIT IV

4.1 National and International efforts for conservation- Information on CITES, IUCN, CBD

4.2 International agreements for conserving marine life. Convention on wetlands of International Importance (Ramsar convention).

4.3 Human impact on Terrestrial and Aquatic resources. Overview of conservation of Forest & Grassland resources

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

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

UNIT V

5.1 Human – wildlife interactions

5.2 Strategies to reduce human-wildlife interactions

5.3 Role of Government and NGOs in controlling human-wildlife interactions Socio-economic issues related to human-wildlife interactions

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

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

REFERENCE BOOKS

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

SUGGESTED ACTIVITIES:

- Visit to nearby biosphere reserve
- Visit to local Ramsar site and report preparation with

Smt. N. P. S Govt. Degree College for Women (A), Chittoor
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Semester –IV:: Syllabus :: 2026-27

COURSE 10: WILDLIFE AND CONSERVATION BIOLOGY
CURRICULUM: 2025-28(R25) VERSION: 2.0

Theory	Paper code:25ZOO410T	Credits: 3	3 hrs/week
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COURSE OBJECTIVES:

- ❑ To Grasp the principles of wildlife ecology, identify key threats to wildlife in India, and evaluate conservation approaches.
- ❑ To Recognize the importance and types of protected areas (National Parks, Sanctuaries, Biosphere Reserves) and their components in habitat conservation.
- ❑ To Apply wildlife management strategies and legislation to protect and manage endangered species and their habitats.
- ❑ To Examine the complexities of human-wildlife interactions and propose effective mitigation strategies.
- ❑ To Discuss national and international conservation initiatives, including conventions (CITES, IUCN, CBD, Ramsar) and their role in biodiversity protection.

LEARNING OUTCOMES:

This course will provide students with a deep knowledge in acquiring laboratory skills, by completion of the course the graduate shall able to –

- ❑ Know the Concept of wildlife and reasons for their depletion
- ❑ Know the wild life management strategies
- ❑ Know the Importance of ecologically sensitive areas
- ❑ Know the human Impact on environmental resources
- ❑ Understand the human wildlife interaction

SYLLABUS:

UNIT I

1.1 Wildlife wealth of India & threatened wildlife.

1.2 Reasons for wildlife depletion in India. Wildlife conservation approaches and limitations.

1.3 National Parks, Sanctuaries and Biosphere Reserves, cores and Buffers, Nodes and corridors.
Community Reserve and conservation Reserves

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

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

UNIT II

2.1 Red Data Book and Conservation status (endangered, vulnerable, rare, threatened and near threatened species)-definitions.

2.2 Wild life Trade & legislation- Assessment, documentation, Prevention of trade

2.3 Policies and laws in Wild life management (national) and ethics.

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

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

UNIT III

3.1 Biodiversity extinction and conservation approaches- Identification and prioritization of Ecologically sensitive area (ESA).

3.2 Regional and National approaches for biodiversity conservation.

3.3 Population viability analysis-conceptual foundation, uses of PVA models.

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

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

UNIT IV

4.1 National and International efforts for conservation- Information on CITES, IUCN, CBD

4.2 International agreements for conserving marine life. Convention on wetlands of International Importance (Ramsar convention).

4.3 Human impact on Terrestrial and Aquatic resources. Overview of conservation of Forest & Grassland resources

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

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

UNIT V

5.1 Human – wildlife interactions

5.2 Strategies to reduce human-wildlife interactions

5.3 Role of Government and NGOs in controlling human-wildlife interactions Socio-economic issues related to human-wildlife interactions

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

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

REFERENCE BOOKS

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

SUGGESTED ACTIVITIES:

- Visit to nearby biosphere reserve
- Visit to local Ramsar site and report preparation with

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B.Sc. (Honours) - Zoology
Semester –IV:: 2026-27

COURSE 10: WILDLIFE AND CONSERVATION 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. S Govt. Degree College for Women (A), Chittoor

B.Sc. (Honours) - Zoology

Semester –IV:: 2026-27

COURSE 10: WILDLIFE AND CONSERVATION BIOLOGY

BLUE PRINT

<u>UNIT</u>	<u>SHORT ANSWER QUESTIONS</u>	<u>LONG ANSWER QUESTIONS</u>
<u>I</u>	<u>2</u>	<u>2</u>
<u>II</u>	<u>2</u>	<u>2</u>
<u>III</u>	<u>2</u>	<u>2</u>
<u>IV</u>	<u>2</u>	<u>2</u>
<u>V</u>	<u>2</u>	<u>2</u>
<u>Total</u>	<u>10</u>	<u>10</u>

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Semester –IV:: 2026-27

COURSE 10: WILDLIFE AND CONSERVATION BIOLOGY

Model Question Paper

Paper code: 25ZOO410T

Time:3hr

Marks:70

I. Answer any FIVE of the following questions: $5 \times 4 = 20$

Each question carries FOUR marks only.

1. Write a short note on the wildlife wealth of India.
2. What are the reasons for wildlife depletion in India?
3. Define the Red Data Book.
4. What is meant by wildlife trade?
5. Define Ecologically Sensitive Areas (ESA).
6. Write a short note on Population Viability Analysis (PVA).
7. Expand CITES, IUCN and CBD.
8. Write a short note on the Ramsar Convention.
9. What are human–wildlife interactions?
10. Mention the role of NGOs in wildlife conservation.

II. Answer any FIVE of the following questions:

$5 \times 10 = 50$

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

11. a) Explain the wildlife conservation approaches in India.

OR

b) Describe National Parks, Wildlife Sanctuaries and Biosphere Reserves.

12. a) Explain the conservation status of wildlife.

OR

b) Describe the policies and laws related to wildlife management in India.

13. a) Explain the Biodiversity extinction

OR

b) Describe the regional and national approaches for biodiversity conservation.

14. a) Explain the International agreements for conserving marine life.

OR

b) Describe the human impact on terrestrial and aquatic resources.

15. a) Explain the strategies to reduce human–wildlife interactions.

OR

b) Describe the socio-economic issues related to human–wildlife interactions.

APSCHE

SEMESTER-IV

COURSE 10: WILDLIFE AND CONSERVATION BIOLOGY

Practicals

Paper code:

Credits: 1

2 hrs/week

COURSE OBJECTIVES:

To Understand the importance of various biomes

To Understand and gain knowledge of animal architecture

SYLLABUS:

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

WEB RESOURCES FOR LAB:

https://www.naturepl.com/pictures/pdfs/NPL_Architecture.pdf

<https://youtu.be/31PWjb7Do1s>

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B.Sc. (Honours) - Zoology
Semester –IV:: Syllabus :: 2026-27

COURSE 10: WILDLIFE AND CONSERVATION BIOLOGY

Practicals

Paper code:25ZOO410P

Credits: 1

2 hrs/week

COURSE OBJECTIVES:

To Understand the importance of various biomes

To Understand and gain knowledge of animal architecture

SYLLABUS:

1. Using photographs / paintings / coloured drawings identify and study ecological role of characteristic animal species (major representative species only) of various Biomes.
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Smt. N. P. S Govt. Degree College for Women (A), Chittoor
B.Sc. (Honours) - Zoology
Semester –IV:: 2026-27

COURSE 10: WILDLIFE AND CONSERVATION BIOLOGY

Practical-Model Question Paper

Paper code: 25ZOO410P

Time:3hr

Marks:50

S.No	Question	Marks
1	Major Experiment	1 x 20 = 20
2	Slides/Specimens/Images/Charts any 4	4 x 5 = 20
3	Record and Viva-voce	10M
	Total	50M

Smt. N. P. S Govt. Degree College for Women (A), Chittoor
B.Sc. (Honours) - Zoology
Syllabus :: 2026-27

Department of Zoology

Certificate Course on *Introduction to Medical Lab Techniques*

S. No.	Heading	Particulars
1	Title of the Course	Certificate Course on <i>Introduction to Medical Lab Techniques</i>
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	2026-2027

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. <i>Examples:</i> - 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
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Section	Type of Question	Marks	Remarks / Examples
B	Experiment (Any One)		handling or routine lab test. <i>Examples:</i> - 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. <i>Examples:</i> 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.

PAPER SETTERS / EXAMINERS

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Smt. N. P. S Govt. Degree College for Women (A), Chittoor
DEPARTMENT OF ZOOLOGY
B.Sc. (Honours) - Zoology
Minutes For Board of Studies in Zoology

Date: 6-08-2026

Time: 11:00 AM

Chairperson: Smt. C. Komaladevi

The Board of Studies meeting of the Department of Zoology, Smt. N.P.Savithramma Govt. Degree College for Women (A), Chittoor, was held on 6 th August, 2026 at 11:00 AM under the chairmanship of Smt. C. Komaladevi. 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 resolved to **revise, update, and modify** the **UG (B.Sc. Zoology Honours) III Semester Course-5**, entitled *Genetics*, including the **syllabus, model question paper, and blueprint** as per recent curriculum requirements.
6. It was resolved to **revise and update** the **UG (B.Sc. Zoology Honours) III Semester Course-6**, entitled *Evolution and Zoogeography*, with necessary modifications in the **syllabus, model question paper, and blueprint**.

7. The Board approved the **revision of UG (B.Sc. Zoology Honours) III Semester Course-7**, entitled *Animal Physiology:Life Sustaining systems*, by updating the **syllabus, model question paper, and blueprint** in line with academic advancements.
8. The Board resolved to **revise and modify the UG (B.Sc. Zoology Honours) IV Semester Course-8**, entitled *IMMUNOLOGY*, along with its **syllabus, model question paper, and blueprint**.
9. The Board resolved to **revise and modify the UG (B.Sc. Zoology Honours) IV Semester Course-9**, entitled *Animal Biotechnology*, along with its **syllabus, model question paper, and blueprint**.
10. The Board resolved to **revise and modify the UG (B.Sc. Zoology Honours) IV Semester Course-10**, entitled *Wildlife and Conservation biology*, along with its **syllabus, model question paper, and blueprint**.
11. The Board discussed and unanimously **approved the Certificate Course on “Introduction to Medical Lab Techniques”** with suitable modifications wherever necessary.
12. The Board resolved to **approve the external and internal scheme of examination** for all semesters of B.Sc. Zoology (Honours) under CBCS guidelines.
13. The Board unanimously **approved the panel of question paper setters and examiners** for B.Sc. Zoology (Honours).
14. The Board resolved to **approve innovative teaching methodologies and evaluation patterns** under CBCS for effective implementation.
15. The Board approved **industrial and field-based student study projects, study tours, and area study programmes** for the academic year 2026–2027.
16. The Board resolved to **approve proposals for organizing seminars, conferences, workshops, and research projects** under the autonomous grant for the academic year 2026–2027.
17. 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 2026–2027.
18. The Board discussed and **approved suggestions regarding evaluation and assessment patterns** for B.Sc. Zoology (Honours).

19. 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.

Principal

Smt. N. P. S Govt. Degree College for Women (A), Chittoor
DEPARTMENT OF ZOOLOGY
B.Sc. (Honours) - Zoology
Board of Studies 2026-27

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