

**SRI VENKATESWARA UNIVERSITY - TIRUPATI**  
B.S.c., (Honours) in **ZOOLOGY (MAJOR)**  
**III SEMESTER**  
**(W.E.F. Academic Year 2024-25)**  
**COURSE5:ANIMALDIVERISTY-IIBIOLOGYOF CHORDATES**

**Theory**

**Credits:3**

**3hrs/week**

**LEARNINGOBJECTIVES**

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

**LEARNING OUT COMES:** By the completion of the course the graduate should be able to–

- Describe general taxonomic rules on animal classification of chordates
- Classify Protochordata to Mammalia with taxonomic keys
- Understand Mammals with specific structural adaptations
- Understand the significance of dentition and evolutionary significance
- 

Understand the origin and evolutionary relationship of different phyla from Protochordata to Mammalia.

**SYLLABUS:**

**UNIT-I**

- 1.1 General characters and classification of Chordata up to classes
- 1.2 Salient features of Cephalochordata, Salient features of Urochordata
- 1.3 Structure and life history of *Herdmania*, Retrogressive metamorphosis –Process and Significance
- 1.4 Cyclostomata, General characters, Comparison of Petromyzon and Myxine

**Activity: Model preparation /Assignment /Students**

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

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

**UNIT-II**

- 2.1 General characters of Fishes, Salient features Dipnoi
- 2.2 *Scoliodon*: External features, Digestive system, Respiratory system
- 2.3 *Scoliodon* Structure and function of Heart, Structure and function of the Brain.
- 2.4 Migration in Fishes, Types of Scales

**Activity: Model preparation /Assignment /Students**

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

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

### **UNIT-III**

- 3.1 General characters of Amphibia, General characters of Reptilia
- 3.2 *Rana hexadactyla*: External features, Respiratory system, Structure and function of Heart
- 3.3 *Rana hexadactyla* structure and functions of the Brain
- 3.4 *Calotes*: External features, Digestive system, structure and function of Brain
- 3.5 Identification of Poisonous snakes

**Activity: Model preparation /Assignment /Students**

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

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

### **UNIT-IV**

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

**Activity: Model preparation/Assignment /Students**

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

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

### **UNIT-V**

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

**Activity: Model preparation/Assignment /Students**

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

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

**Co-curricular activities (suggested)**

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

### **REFERENCE BOOKS**

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

**Choice Based Credit System**  
**II BSC- SEMESTER – III**  
**Model Question Paper - 2024-2025**  
**SUB: Zoology Major**  
**Paper: Animal Diversity- I Biology of Chordates**

**Time: 3 Hrs.**

**Max Marks: 70**

**PART – A**

**Answer any Five of the following Questions in not more than 50 words each.**

**5 x 4 = 20 Marks**

1. Tunicata
2. kangaroo
3. Dipnoi
4. Types of scales
5. Quill feathers
6. Apoda
7. Poisonous snakes
8. Aquatic mammals adaptations

**I. Answer any Five of the following Questions and draw the labeled diagrams where ever necessary**

**5x 10 = 50 Marks**

9.a. Explain the retrogressive metamorphosis and significance of Herdmania.

or

9.b. Compare the characters of petromyzon and myxine

10. a. Describe the structure and functions of brain of scoliodon

or

10.b write an essay on migration in fishes

11.a. describe the structure and functions of heart of frog.

Or

11.b. Describe the general characters of reptiles and classify them up to classes

12.a. Describe the respiratory system in birds

Or

12.b Write an essay on flight adaptations in birds

13.a Describe the general characters of mammals and classify them up to classes

Or

13.b. Write an essay on dentition in mammals

**SRI VENKATESWARA UNIVERSITY - TIRUPATI**  
B.S.c., (Honours) in **ZOOLOGY (MAJOR)**  
**III SEMESTER**  
**(W.E.F. Academic Year 2024-25)**  
**COURSE5:ANIMALDIVERISTY-IIBIOLOGYOF CHORDATES**

**PRACTICAL**

**Credits:1**

**2hrs/week**

**LEARNINGOBJECTIVES**

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

**SYLLABUS:**

1. Protochordata: *Herdmania, Amphioxus, Amphioxus* T. S through pharynx.
2. Cyclostomes: *Petromyzon* and *Myxine*.
3. Pisces  
: *Pristis, Torpedo, Hippocampus, Exocoetus, Echeneis, Labeo, Catla, Clarius, Chan na, Anguilla*.
4. Amphibia: *Ichthyophis, Amblystoma, Axolotllarva, Hyla*,
5. Reptilia: *Draco, Chamaeleon, Uromastix, Testudo, Trionyx, Russelsviper, Naja, Krait, Hydrophis, Crocodile*.
6. Aves: *Psittacula, Eudynamis, Bubo, Alcedo*.
7. Mammalia: *Ornithorhynchus, Pteropus, Funambulus*.
8. **Dissections**-As per UGC  
guidelines  
*Scoliodon*  
X and X, Cranial nerves  
*Scoliodon* Brain  
**Mounting of fish scales**

**Note: 1. Dissections are to be demonstrated only by the faculty or virtual.**  
**2. Laboratory Record work shall be submitted at the time of practical examination.**

**REFERENCE WEBLINKS:**

- <https://nt7-mhe-complex-assets.mheducation.com/nt7-mhe-complex-assets/Upload-20190715/InspireScience6-8CA/LS15/index.html>
  - <https://themammallab.com/>
  - <http://abacus.bates.edu/acad/depts/biobook/LabConCh.htm>
  - <https://virtualzoology.wordpress.com/scoliodon/>
  - <http://www.zoologyresources.com/uploadfiles/books/dc64b77d8769325515d17c945e461b45.pdf>
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Verified and Approved by Dr.M.VANI HOD & BOS Chairperson (Zoology)

**Choice Based Credit System**  
**II BSC- SEMESTER – III**  
**Model Practical Question Paper - 2024-2025**  
**SUB: Zoology Major & Minor**  
**Paper: Animal Diversity- I Biology of Chordates**

**Time: 2 Hrs.**

**Max Marks: 50**

1. Dissect and display the *Scoliodon* IX and X, Cranial nerves and draw neat labeled diagram  
marks 10
  
2. Identify the following spotters and draw neat labeled diagram 5x5 = 25 marks  
  
A  
B  
C  
D  
E
  
3. Viva voce 5 marks
  
4. Certified Record 10 marks

**SRI VENKATESWARA UNIVERSITY - TIRUPATI**

B.S.c., (Honours) in **ZOOLOGY (MAJOR)**

**III SEMESTER**

(W.E.F. Academic Year 2024-25)

**COURSE6:PRINCIPLESOFGENETICS**

**Theory**

**Credits:3**

**3hrs/week**

**LEARNINGOBJECTIVES**

- 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 extra chromosomal 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.

**LEARNINGOUTCOMES:**By the completion of the course the graduate should be 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 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 Inbred Lines

1.2 Mendelian Principles on Monohybrid cross, backcross and Testcross

1.3 Mendelian Principles on Dihybrid cross

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

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



## **UNIT-II:**

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

***Activity: Assignment/Students Seminar/Quiz/Project/Peerteaching/ 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 Extrachromosomal inheritance- Kappa particles in Paramecium and Shell coiling in snails

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

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

## **UNIT-IV:**

- 4.1 Sex determination- Chromosomal theory and Genic Balance theory
- 4.2 Sex determination- Hormonal, Environmental and Haplo-diploidy types
- 4.3 Sex linked inheritance: X-linked inheritance
- 4.4 Sex linked inheritance: Y-linked & XY-linked inheritance**

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

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

## **UNIT-V:**

- 5.1 Human karyotyping, Pedigree Analysis (basics)
- 5.2 Autosomal Recessive disorder- Sickle cell anaemia- causes, treatment, inheritance pattern, modes of testing and prevention
- 5.3 Autosomal Dominant disorder- Huntington disease
- 5.4 Basics on Genomics and Proteomic

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

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

### **CO-CURRICULAR ACTIVITIES (SUGGESTED)**

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

### **REFERENCE BOOKS:**

- Harper, P. (2010). Practical genetic counselling. CRC Press.
  - Kessler, S. (Ed.). (2013). Genetic counselling: psychological dimensions. Academic Press. 3.
  - Stevenson, A. C., & Davison, B. C. (2016). Genetic counselling. Elsevier.
  - Evans, C. (2006). Genetic counselling: a psychological approach. Cambridge University Press.
  - References:
  - Atlas of Inherited Metabolic Diseases □
  - Mendelian Inheritance in Man: A Catalog of Human Genes and Genetic Disorders, Victor A. McKusick, 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.N.B. 1996: Gene Trophy, Bios Scientific Pub. Oxford.
  - REFERENCES:
  - Gardner, E.J., Simmons, M.J., Snustad, D.P. (2008). Principles of Genetics. VIII Edition. Wiley India
  - Snustad, D.P., Simmons, M.J. (2009). Principles of Genetics. V Edition. John Wiley and Sons Inc.
  - Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics. X Edition. Benjamin Cummings.
  - Russell, P.J. (2009). Genetics- A Molecular Approach. III Edition. Benjamin Cummings.
  - Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B. Introduction to Genetic Analysis. IX Edition. W. H. Freeman and Co.
  - James D. Watson, Nancy H. Hopkins 'Molecular Biology of the Gene'
  - Gupta P.K., 'Genetics'
- .....

**Four Year Honours Degree Examination**  
**Choice Based Credit System**  
**II BSC- SEMESTER – IV**  
**Model Question Paper - 2024-2025**  
**SUB: Zoology Major& Minor**  
**PAPER :6: PRINCIPLES OF GENETICS**

**TIME : 3 Hrs**

**Max. Marks : 70**

**Section-A**

**Answer any FIVE of the following**

**5 x 4 = 20 M**

1. Concept of Phenotype
2. Incomplete Dominance
3. Epistatistics
4. Erythroblastofetalsis
5. Polysomes
6. X- Linked inheritance
7. Sickel cell anaemia
8. Genomics

**II. Answer any Five of the following Questions and draw the labeled diagrams where ever necessary**

5X 10 = 50 Marks

9.a Write an essay on History of Genetics and explain their importance ?

( Or )

b. Describe Mendelian principles through Monohybrid and d hybrid cross

10. a. What is Linkage ? Explain complete linkage and Incomplete linkage and significance.

(or)

b. What is crossing over ? Describe mechanism of crossing over

11. a. What are the multiple alleles ? Describe multiple alleles with the help of ABO Blood group.

(or)

b. What are polygenes and describe general characters and examples.

12. a. Describe the sex determination mechanism based on differences in chromosomal number.

(or)

b. Write essay on chromosomal theory and genetic balance theory.

13.a. Explain in detail about human karyotyping and pedigree analysis.?

(or)

b. Write essay on autosomal dominant disorders.

## PAPER : 6: PRINCIPLES OF GENETICS

**PRACTICAL**

**Credits:1**

**2hrs/week**

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### **LEARNING OBJECTIVES**

- To acquire practical knowledge on the importance of Mendelian principles by solving the problems.
- To provide the required knowledge on the gene interactions
- To acquaint the student 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://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://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](https://coabnau.in/uploads/1610707528_GPB3.2PracticalManual-Final.pdf)
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Verified and Approved by Dr.M.VANI HOD & BOS Chairperson (Zoology)

**Four Year Honours Degree Examination**  
**Choice Based Credit System**  
**SEMESTER – III**  
**Model Practical Question Paper - 2024-2025**  
**SUB: Zoology Major**  
**PAPER : 6: PRINCIPLES OF GENETICS**

**TIME : 2Hrs**

**Max. Marks : 50**

1. Identify the Bloodgroup and Rh factor in the given blood sample and write the procedure 15 marks

2. Identify and draw neat labeled diagram for the following 5x5= 25 marks

A

B

C

D

E

3. Certified Record 10 marks

**SRI VENKATESWARA UNIVERSITY - TIRUPATI**

B.S.c., (Honours) in **ZOOLOGY (MAJOR)**

**III SEMESTER**

**(W.E.F. Academic Year 2024-25)**

**PAPER :7: ANIMAL BIOTECHNOLOGY**

**Theory**

**Credits:3**

**3hrs/week**

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**LEARNING OBJECTIVES:**

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

**LEARNING OUTCOMES:**

**This course will provide students with a deep knowledge in animal biotechnology, by the completion of the course the graduate shall 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: Superovulation, 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 Bioinformatics-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)

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Verified and Approved by Dr.M.VANI HOD & BOS Chairperson (Zoology)

**Choice Based Credit System**  
**SEMESTER – III**  
**Model Question Paper - 2024-2025**  
**SUB: Zoology Major**  
**PAPER :7: ANIMAL BIOTECHNOLOGY**

Time : 3Hrs

Max Marks:70

PART-A

**I. Answer any Five of the following Questions**

**5 x 4 = 20 Marks**

1. DNA Polymerase
2. Phase Lambda Vector
3. Microinjection
4. DNA Sequencing
5. Primary Cell Culture
6. Super Ovulation
7. Transgenic Sheep
8. Monoculture In Fish.

**II. Answer any Five of the following Questions and draw the labelled diagrams where ever necessary**

**5 x10 = 50 M arks**

**9 a.** Write essay on applications of type II restriction enzymes in genetic engineering ?

**OR**

**9b.** what is vector ? classify vectors and explain their characteristic features and significance.

**10 a.** Write essay on gene delivery ?

**OR**

**10b.** Explain Hybridization techniques? (Or) explain the process of blotting techniques.

**11a.** Write about Hybridoma technology and production of monoclonal antibodies ?

**OR**

**11b.** Write essay on stem cell technology and its applications.

**12a.** What is invitro fertilization? And describe the process methods of invitro m fertilization.

**OR**

**12b.** Explain the production of transgenic animals and transgenesis?

**13a.** Describe the DNA finger printing?

**OR**

**13b** Write essay on polyploidy in fishes ?



**SRI VENKATESWARA UNIVERSITY - TIRUPATI**

B.S.c., (Honours) in **ZOOLOGY (MAJOR)**

**III SEMESTER**

(W.E.F. Academic Year 2024-25)

**COURSE7:ANIMALBIOTECHNOLOGY**

**PRACTICAL**

**Credits:1**

**2hrs/week**

**LEARNINGOBJECTIVES**

**This course will provide students with a practical knowledge in animal biotechnology, by the completion of the course the graduate shall be 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 into 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 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/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://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>
- [https://www.austincc.edu/awheeler/Files/BIOL%201414%20Fall%202011/BIOL1414\\_Lab%20Manual\\_Fall%202011.pdf](https://www.austincc.edu/awheeler/Files/BIOL%201414%20Fall%202011/BIOL1414_Lab%20Manual_Fall%202011.pdf)

Verified and Approved by Dr.M.VANI HOD & BOS Chairperson (Zoology)

**Choice Based Credit System**  
**II BSC- SEMESTER – IV**  
**Model Practical Question Paper - 2024-2025**  
**SUB: Zoology Major& Minor**

PAPER : 7 ANIMAL BIOTECHNOLOGY

Time : 2Hrs

Max Marks:50

- |   |          |
|---|----------|
| 1 What are the techniques used in the DNA Finger printing | 15marks  |
| 2. Explain the Amplification of DNA by PCR                | 10 marks |
| 3.Preparationofculturemedia.                              | 10 marks |
| 4 Viva voce   | 5 marks  |
| 5.Certified Record  | 10 marks |

**SRI VENKATESWARA UNIVERSITY - TIRUPATI**

B.S.c., (Honours) in **ZOOLOGY (MAJOR)**

**III SEMESTER**

(W.E.F. Academic Year 2024-25)

**COURSE8:EVOLUTION AND ZOO GEOGRAPHY**

**Theory**

**Credits:3**

**3hrs/week**

**LEARNING 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 the graduate shall 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/Peerteaching/ 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 Palaeontological 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 biogeographical distribution

***Activity: Assignment/Students Seminar/Quiz/Project/Peerteaching/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-NeoLamarckism
- 3.2 Germplasm theory-August Weismann
- 3.3 Darwinism-Theory of Natural selection
- 3.4 Modern synthetic theory of evolution (NeoDarwinism)

***Activity: Assignment/Students Seminar/Quiz/Project/Peerteaching/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/Peerteaching/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 (Suggested)**

- 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 Kedar Nath 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
  - Verified and Approved by Dr. M. VANI HOD & BOS Chairperson (Zoology)
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**Choice Based Credit System**  
**SEMESTER – III**  
**Model Question Paper - 2024-2025**  
**SUB: Zoology Major**  
**Paper: EVOLUTION AND ZOOGEOGRAPY**

**Time: 3 Hrs.**

**Max Marks: 70**

**PART – A**

**I Answer any Five of the following Questions 5 x 4 = 20 Marks**

1. Neo darwinism
2. Germ plasm theory
3. kangaroo
4. Fauna of oriental region
5. Isolation
6. Mutations
7. Sewall wright effect
8. big bang theory

**II Answer any Four of the following Questions not exceeding 300 words each. And draw the labeled diagrams where ever necessary**

**5 x 10 = 50  
Marks**

9.a. Explain the origin of life

Or

9.b. Describe the

10 a. Explain the embryological and physiological evidence of evolutions

Or

10.b Explain the morphological and anotanomical evidence of evolutions

11.a. Lamarkism

Or

11.b Explain the modern synthetic theory of evolution

12.a. Describe about the Hardy wein burg law

Or

12.b Write an essay on variations and types

13.a. Describe the fauna of Ethiopian region

Or

13.b Explain the fauna of Oriental region

**SRI VENKATESWARA UNIVERSITY - TIRUPATI**  
B.S.c., (Honours) in **ZOOLOGY (MAJOR)**  
**III SEMESTER**  
**(W.E.F. Academic Year 2024-25)**

**COURSE8: EVOLUTION AND ZOO GEOGRAPHY**

**Practical**

**Credits:1**

**2hrs/week**

**LEARNING OBJECTIVES**

- Acquainting and skill enhancement in the usage of laboratory equipment
- To apply the basic concept of inheritance for applied research
- To get familiar with phylogeny 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://bio.libretexts.org/Courses/Butte_College/BC%3A_BIOL_2_-_Introduction_to_Human_Biology_%28Grewal%29/Text/09%3A_Biological_Evolution/9.3%3A_Evidence_for_Evolution)
- <https://www.coursehero.com/study-guides/boundless-biology/evidence-of-evolution/>

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**Four Year Honours Degree Examination**  
**Choice Based Credit System**  
**I BSC - SEMESTER - II**  
**Model Practical Question Paper - 2024-2025**  
**SUB: Zoology Major**  
**Paper: EVOLUTION AND ZOO GEOGRAPY**

**Time: 2 Hrs.**

**Max Marks: 50**

1. . Study of Genetic Drift by using examples of Darwin's finches (pictures) 10 marks
2. Identify and draw labeled diagram with identification characters 5x5 =25
  - A Homologous organ
  - B Fossil evidence
  - C Lamarckism / Darwinism image
  - D Phylogeny of horse with pictures
  - E Mapping distribution of animals according to zoogeographical regions
3. Visit to Natural History Museum and submission of report 5 marks
- 4 Certified Record 10 marks