SEMESTER–IV

ZOOLOGY

Practical–IV (Related to ZOO-IVA and ZOO-IV B)

Time: 3hrs. **Marks: 30**

Important Note for Practical:

1. Candidates will be required to submit their original note books containing record of their laboratory work.
2. Wherever possible, students must be taken out for excursion to the field (Zoological gardens, sea shores, ponds and hill stations etc.) to study habitat and ecology of the animals.
3. As per the latest UGC guidelines (D.O.No. F. 14-6/2014(CPP-II) dated 01-08-2014) the dissections should not be conducted. The guidelines on this issue are available on the UGC website: www.ugc.ac.in

1. Study of the skeleton of *Scoliodon, Rana, Varanus, Gallus* and *Oryctolagus.*
2. Identification of food stuffs: starch, glucose, proteins and fats in solution.
3. Demonstration of osmosis and diffusion.
4. Demonstrate the presence of amylase in saliva, denaturation by pH and temperature.
5. Determination of coagulation and bleeding time of blood in man/rat/rabbit.
6. Determination of blood groups of human blood sample.
7. Recording of blood pressure of man.
8. Analysis of urine for urea, chloride, glucose and uric acid.
9. Estimation of haemoglobin content.
10. Field study: Visit to a fossil Park/Lab/ Science City and submit a report.
11. Familiarity with the local vertebrate fauna.

Note:- Some changes can be made in the practicals depending on the availability of material.

Guidelines for conduct of Practical Examination:

1.	Identify the given bones, make labeled sketches of their respective–views.	10
2.	Write down the steps and determine the constituents in the given sample.	5
3.	Write the procedure and perform the given physiology experiment.	5
4.	Report on visit to a fossil park/lab/Science City/study of local vertebrate fauna.	5
5.	Viva-voce & Practical file.	5

SEMESTER–VI

BOTANY

Botany Practicals–VI (Based on Papers- VIA and VIB)

Practical Hours: 4½ Hours/week
Practical Marks: 30

Suggested Laboratory Exercises

1. To determine minimum number of quadrats required for reliable estimate of biomass in grasslands through species area curves.
2. To study the frequency of herbaceous species in grassland and to compare the frequency distribution with Raunkiaer's Standard Frequency Diagram.
3. To estimate Importance Value Index for grassland species on the basis of relative frequency, relative density and relative dominance in protected and grazed grassland.
4. To measure the vegetation cover of grassland through point frame method.
5. To measure the above ground plant biomass in a grassland.
6. To study the morphological anatomical features of hydrophytes (*Hydrilla, Eichhornia*) Xerophytes (*Nerium, Calotropis*).
7. To determine diversity indices (richness, Simpson, Shannon-Weaver) in grazed and protected grassland.
8. To estimate bulk density and porosity of grassland and woodland soils.
9. To determine moisture content and water holding capacity of grassland and woodland soil.
10. To study the vegetation structure through profile diagram.
11. To estimate transparency, pH and temperature of different water bodies.
12. To measure dissolved oxygen content in polluted and unpolluted water samples.
13. To estimate salinity of different water samples.
14. To determine the percent leaf area injury of different leaf samples collected around polluted sites.
15. To estimate dust-holding capacity of the leaves of different plant species.
16. **Food Plants:** Study of the morphology, structure and simple microchemical tests of the foods storing tissues rice, wheat, maize, potato and sugarcane. Microscopic examination of starch in these plants (excepting sugarcane).

17. **Fibres:** Study of cotton flowers, sectioning of the cotton ovules/developing seeds to trace the origin and development of cotton fibers. Microscopic study of cotton and test for cellulose.
18. Sectioning and staining of jute stem to show the location and development of fibers.
19. Microscopic structure. Tests for lignocelluloses.
20. **Vegetable Oils:** Study of hand sections of groundnut, mustard and coconut and staining of oil droplets by Sudan III and Sudan Black.
21. **Field Visits:** To study sources of firewood (10 plants)/timberyielding trees (10 trees)/bamboos, list to be prepared mentioning special features, collection of plant based articles of common use.
22. **Spices:** Examine black pepper, cloves, cinnamon (hand sections) and opened of cardamom and describe them briefly.
23. Preparations of an illustrated inventory of 10 medicinal plants used in indigenous systems of medicine or allopathy: Write their botanical and common names parts used and diseases/disorders for which they are prescribed.
24. **Beverages:** Section boiled coffee beans and tea leaves to study the characteristic structural features.
25. Visit to *in situ* conservation site/Botanical Garden.

Suggested Readings (for laboratory exercises)

1. Council of Scientific & Industrial Research. (1986). The Useful Plants of India. Publications and Information Directorate. CSIR, New Delhi.
2. Kocchar, S.L. (2000). Economic Botany of the Tropics, Macmillan India Pvt. Ltd., New Delhi.
3. Krebs, C.J. (1989). Ecological Methodology.Harper and Row, New York, USA.
4. Ludwig, J.A.and Reynolds, J.F. (1988). Statistical Ecology, Wiley, New York.
5. Moore, P.W. and Chapman, S.B. (1986). Methods in Plant Ecology, Blackwell Scientific Publications.
6. Prinentel, D. and Hall, C.W. (Eds.) (1989). Food and Natural Resources. Academic Press, London, New York.
7. Sharma, O.P. (1996). Hill's Economic Botany. Tata McGraw Hill Co. Ltd., New Delhi.
8. Swaminathan, M.S. and Kocchar, S.L. (Eds.) **(1989).** Plants and Society. Macmillan Publications Ltd., London.

SEMESTER–III

ZOOLOGY

Practical-III (Related to ZOO-IIIA and ZOO-IIIB)

Time: 3hrs. **Marks: 30**

Important Note for Practical:-

1. Candidates will be required to submit their original note books containing record of their laboratory work.
2. Wherever possible, students must be taken out for excursion to the field (Zoological gardens, sea shores, ponds and hill stations etc.) to study habitat and ecology of the animals.
3. As per the latest UGC guidelines (D.O.No. F. 14-6/2014(CPP-II) dated 01-08-2014) the dissections should not be conducted. The guidelines on this issue are available on the UGC website: www.ugc.ac.in

I. Classification up to order level, except in case of Pisces and Aves where classification up to subclass level, habits, habitat, external characters and economic importance (if any) of the following animals is required :

Urochordata : *Herdmania, Molgula, Pyrosoma, Doliolum, Salpa & Oikopleura.*

Cephalochordata : *Amphioxus.* Study of the following prepared slides:

T.S. *Amphioxus* through various regions, Pharynx of *Amphioxus*

Cyclostomata : *Myxine, Petromyzon & Ammocoetes* Larva.

Chondrichthyes : *Zygaena* (hammer head shark), *Pristis* (saw fish), *Narcine (electric ray), Trygon, Rhinobatus and Chimaera* (rabbit fish).

Actinoptergii : *Polypterus, Acipenser, Lepidosteus, Muraena, Mystus, Catla, Hippocampus, Syngnathus, Exocoetus, Anabas, Diodon, Tetradon, Echeneis and Solea.*

Dipneusti (Dipnoi) : *Protopterus* (african lung fish)

Amphibia : *Uraeotyphlus, Necturus, Amphiuma, Amblystoma* and its Axolotl Larva, *Triton, Salamandra, Hyla, Rhycophorus*

Reptilia : *Hemidactylus, Calotes, Draco, Varanus, Phrynosoma, Chamaeleon, Typhlops, Python, Eryx, Ptyas, Bungarus, Naja, Hydrus, Vipera, Crocodilus, Gavialis, Chelone* (turtle) and *Testudo* (tortoise),Differences in nonpoisonous and poisonous snakes.

Aves : *Casuarius, Ardea, Anas, Milvus, Pavo, Eudynamics, Tyto* and *Alcedo.*

Mammalia : *Ornithorynchus, Echidna, Didelphis, Macropus, Loris, Macaca, Manis, Hystrix, Funambulus, Panthera, Canis, Herpestes, Capra, Pteropus.*

II.	Study of the following systems with the help of charts/models/videos:
Herdmania	: General anatomy
Labeo	: Digestive and reproductive systems, heart, afferent and branchial arteries, cranial nerves and internal ear.
Chick	: Digestive, arterial, venous and urino-genital systems.
White Rat	: Digestive, arterial, venous and urino-genital systems.

Study of permanent slides of whole mount of Pharynx of *Herdmania* and *Amphioxus.* Cycloid scales of *Labeo,* blood smear of mammal, Histology of rat/rabbit (compound tissues)

Demonstration of evolutionary phenomena like homology, analogy, mimicry, crypsis.
Study of evolution of horse/elephant/man.

Study of fossils.

Assignment

Note:- Some changes can be made in the practicals depending on the availability of material.

Guidelines for conduct of Practical Examination:

1.	Draw a labelled sketch of the system of the given animal & explain it to the Examiner.	4
2.	Identify and classify the specimens upto order level. Write a short note on habitat, special features, feeding, habits and economic importance of the specimens.	8
3.	Idendify and write a note on the evolutionary phenomenon in the given specimen.	4
4.	Identify the slides/specimens, give two reasons for identification.	5
5.	Assignment	4
6.	Viva-voce & Practical file.	5

B.A./B.Sc. (Semester System) *(12+3 System of Education) (Semester–V) (Batch 2021-24)*
(Faculty of Life Sciences)

SEMESTER–V

ZOOLOGY

Practical-V (Related to ZOO-V A and ZOO-V B)

Time: 3hrs. **Marks: 30**

Important Note for Practical:

1. Candidates will be required to submit their original note books containing record of their laboratory work.
2. Wherever possible, students must be taken out for excursion to the field (Zoological gardens, sea shores, ponds and hill stations etc.) to study habitat and ecology of the animals.
3. As per the latest UGC guidelines the dissections may please be avoided. In no case an animal falling under the categories of wildlife protection act 1972 should be caught or dissected. The rules of the Prevention of cruelty to Animals act 1960 should be familiar to all who are teaching the zoology courses. The guidelines on this issue are also available on the UGC website: www.ugc.ac.in

1. Demonstrate the Law of segregation and independent assortment (use of coloured beads capsules etc.) Numericals for segregation, independent assortment and Epistasis as well as numerical based on chi square.
2. Demonstration of segregation in preserved material (Maize).
3. Demostation of cytoplasmic inheritance in snails.
4. Inheritance of human characteriscts.
5. Comparison of variance in respect of pod length and number of seeds/pods.
6. Calculation of gene frequencies and random mating (coloured beads, capsules).
7. Pedigree analysis
8. Dermatoglyphics: Palm print and finger tip patterns.
9. Study of the following permanent slides :
   - Polytene Chromosomes of *Chironomus.*
   - Stages of gametogenesis, structure of egg and sperm of a mammal.
   - Larva of *Herdmania.*
   - Developmental stages of freshwater snail *(Limnaea),* frog-upto tadpole, chick-upto 96 hr.
10. Preparation of charts showing developmental stages of any vertebrate.
11. Preparation of slide for Barr body from cheek cells.

Note:- Some changes can be made in the practicals depending on the availability of material.

Guidelines for conduct of Practical Examination:

1.	Two Numericals based on Mendel/Hardy Weinberg Law.	10
2.	Perform the experiment for Dermatoglyphics/ Random mating/ Pod Length.	4
3.	Identification of given spots/slides.	6
4.	Make a pedigree chart from the given data.	3
5.	Chart/Assignment.	2
6.	Viva-voce and practical file.	5

SEMESTER–VI

GEOGRAPHY

MAP PROJECTIONS-II AND FIELD WORK (PRACTICAL)

Max. Marks: 30
Written Paper of 3 Hours: 15 Marks
Practical Record (File): 08 Marks
Viva: 07 Marks

Objectives:

- To Provide an analytical understanding of use of common map projections.
- To acquaint the students with the importance of field work as one of the methodologies in geography.
- To sensitize the students about pre-field work and post-field work i.e. data processing and analysis and writing of field work report.

UNIT–I

Construction, Properties and Limitations of following Map Projections:
Zenithals: Gnomonic, Stereographic, Orthographic, Equi-distant and Equal- Area (Polar cases only).
Introduction to Sinusoidal and Molleweide's Projections.
General principles of identification and choice of projections

UNIT–II

Role of field work in Geography.
Scale of study and field work methodology.
Methods of collecting Primary data (questionnaire, observation, interview and measurement) and Secondary data and parts of report.
Methods of field study of: a Farm, a Village, a Town and Physical Features of an area.

Note:

1. A compulsory question containing 10 short answer type questions will be set covering the whole syllabus. The students will attempt 6 short answer type questions in about 25–30 words each. Each short answer type question will carry ½ mark (Total 3 marks).
2. The whole syllabus will be divided into 2 UNITs. Eight questions will be set out of the whole syllabus, four from each UNIT. The students will be required to attempt two questions from each UNIT. Each question will carry 3 marks. These will be in addition to the compulsory question at serial number 1. (Total 12 marks)
3. Evaluation of Practical record will be done at the time of viva–voce examination.
4. In case the candidate has applied for the improvement, he/she should be required to make a fresh practical note book.
5. For practical classes, the number of students in one group shall not exceed fifteen.