(As per New Education Policy 2020)

B.Sc. I Semester Examination, 2024

ZOOLOGY

ZOO5001T : Animal Diversity and Evolution

THEORY : Max. Marks: 100
PRACTICAL : Max. Marks: 100

Discipline Centric Core Course (DCC Course)

ZOO5001T - Animal Diversity & Evolution

Learning objective of the course

The course for the Animal Diversity & Evolution is dealing with the diversity, principles of systematics and categorization of invertebrate organisms.

Functional morphology of the types included with special emphasis on the adaptations to their modes of life and environment. General characters and classifications of all invertebrate phyla up to class with examples emphasizing their biodiversity, economic importance and conservation measures where required.

Unit 1: General principles of taxonomy, concept of the five-kingdom, Concept of Protozoa, Metazoa and Levels of organization. Basis of classification of non-chordata: Symmetry, coelom, segmentation and embryogeny, Characters and Classification of Protozoa and Porifera upto classes with examples.

Unit 2: Salient features and classification of Coelenterata, Ctenophora, Platyhelminthes, Aschelminthes, Annelida, Arthropoda, Mollusca and Echinodermata with their suitable examples.

Unit 3: Origin of Life, Miller's experiment, Lamarckism and Darwinism, Natural Selection, genetic basis of evolution, speciation, Evidences of organic evolution.

Unit 4: Variations, Isolation and Adaptations, Geological time scale and animal distribution in different era.

Unit 5: Principal zoogeographical regions of the world with special reference to their mammalian fauna, Factors affecting the large scale animal distribution, Origin and evolution of man.

ZOO5001P Practical

1. Diagramatic representation of dissections :

Annelida- Pheretima : General anatomy and nervous system
Arthropoda- Periplaneta : General anatomy and nervous system
Palaemon: General anatomy and nervous system
Mollusca- *Pila*: General anatomy and nervous system
Lamellidens /Unio: General anatomy and nervous system

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2. Identification, systematic position up to order and general study of the following animal forms, microscopic slides / museum specimens:

Protozoa: [Whole mounts] *Amoeba, Entamoeba, Euglena, Noctiluca, Trypanosoma, Trichomonas, Foraminifera* (Oozes), *Opalina, Balantidium, Nyctotherus, Paramecium, Paramecium* binary fission and conjugation and, *Vorticella.*

Porifera: *Leucosolenia, Grantia, Scypha, Hyalonema, Euplectella, Spongilla* and *Euspongia*

Coelenterata: *Obelia* (colony and medusa), *Physalia, Porpita, Aurelia, Rhizostoma,Alcyonium, Corallium, Gorgonia, Tubipora, Pennatulla* and *Madrepora*

Ctenophora: *Beroe*

Platyhelminthes: *Dugesia, Fasciola* and *Taenia*

Nematoda: *Ascaris, Ancylostoma, Dracunculus, Wuchereria, Trichinella,Schistosoma* and *Enterobius*

Annelida: *Nereis*, Phase Heteronereis, *Aphrodite, Arenicola, Pheretima, Pontobdella,Branchellion* and *Hirudinaria*

Onychophora: *Peripatus*

Arthropoda : *Limulus, Araneus, Palamnaeus, Apus, Lepas, Balanus, Sacculina, Palaemon, Lobster, Eupagurus, Carcinus, Lepisma, Odontotermes, Pediculus, Schistocerca, Papilio, Bombyx, Xenopsylla, Apis, Julus* and *Scolopendra*

Mollusca: *Chiton, Dentalium, Patella, Pila, Turbinella, Aplysia*, Slug, Snail, *Mytilus, Ostrea* (pearl oyster), *Lamellidens, Teredo, Nautilus, Sepia, Octopus* Enchinodermata: *Pentaceros, Asterias, Ophiothrix, Echinus, Holothuria* and *Antedon*

Diagramatic representation of dissection Earthworm and palemoen

Marks Distribution

S.No.	Exercises	Marks
1	Diagramatic representation of dissection	15
2	Spots (10 x 4)	40
3	Viva – voce	15
4	**Internal Assignment:-** Practical Record Overall Performance	 20 10
Total		**100**

Note: Each regular student is required to keep a record of practical work done by him/her duly checked by the teacher which will be submitted at the time of practical examination.

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Recommended Books (All latest editions)

1. Prasad, Beni: *Pila*, Lucknow Publishing House, Lucknow.
2. Bhatia, M. L.: *Hirudinaria*, Lucknow Publishing House, Lucknow.
3. Koipal, R. L. :*Invertebrates*, Rastogi Publications, Meerut.
4. Nigam, H. C. :*A University Course in Invertebrate Zoology*, Vol. I, Mc Milan, London.
5. Prasad, S. N. :*Text Book of Invertebrate Zoology*, KitabMahal, Allahabad.
6. Parwardhan, S. S. :*Palaemon*, Lucknow Publishing House, Lucknow.
7. VishwaNath :*A Text Book of Zoology*, Vol. I, Invertebrate, S. Chand & Co., New Delhi.
8. Rastogi, Veerbala :*Invertebrate Zoology*, KedarNath Ram Nath, Delhi.
9. Jordan, E. L. and P. S. Verma; *Invertebrate Zoology*, S. Chand & Co. Ltd., Ram Nagar, NewDelhi.

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B.Sc. II Semester (ZOOLOGY) Examination, 2025

ZOO5002T: Biology of Non chordates

THEORY : Max. Marks: 100
PRACTICAL : Max. Marks: 100

Discipline Centric Core Course (DCC Course)

ZOO5002T: Biology of Non chordates

Learning objective of the course

The course for the biology of non-chordates is dealing with the categorization of non-chordates organisms from unicellular to multicellular with different grading of body forms.

Unit 1: *Euglena:* Ultrastructure of flagellum and flagellar movement, osmoregulation andbehaviour, reproduction.

Paramecium: Locomotion, nutrition, osmoregulation and reproduction. *Sycon*:Cellular organization, canal system, reproduction and development.

Unit 2: *Obelia:* Structure of polyp and medusa, sense organs and reproductive systems,life cycle.

Fasciola: Digestive, excretory and reproductive systems, developmental stages andlife cycle.

Taenia: Structure of body wall, excretory and nervous systems, reproduction anddevelopmental stages in life cycle.

Unit 3: *Nereis:* Parapodial locomotion, digestive, blood vascular, excretory, nervous and reproductive systems, development and metamorphosis.

Hirudinaria: Digestive, haemocoelomic, excretory, nervous and reproductive systems, sense organs.

Unit 4: *Palaemon:* Appendages, Digestive, respiratory, blood – vascular, excretory,nervous, sense organs and reproductive systems.

Pila: Digestive, respiratory, blood vascular, nervous and reproductive systems,sense organs

Unit 5: *Lamellidens*: Digestive, respiratory, blood–vascular, excretory and nervoussystems, sense organs, reproduction and development.

Asterias: Water – vascular system, digestive, circulating and nervous systems,sense organs, reproduction, life history and regeneration.

ZOO5002P: Practical

1. Study of sections, developmental stages and isolated structures (microscopicslides)

Porifera: L. S. and T. S. of *Scypha / Grantia*

Coelenterata: *Hydra*, Sections of *Hydra*, Developmental stages of *Aurelia*

Platyhelminthes: Transverse sections of *Dugesia, Fasciola* and *Taenia*, mature and gravid proglottids of *Taenia*, developmental stages of *Fasciola* and *Taenia*

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Annelida:Transverse sections of *Nereis* and *Hirudinaria*, Trochophore larva of Nereis, Parapodium of *Nereis* and *Heteronereis*

Arthropoda: Crustacean larvae (*Nauplius, Zoea, Megalopa* and *Mysis*), mosquitolarva & pupa.

Mollusca: Transverse sections of *Lonellidens* and Glochidium larva.

Echinodermata:Pedicellariae of Star fish.

a. Study of living *Paramecium*

2. Permanent preprations : (i) Protozoa : *Paramecium/ Euglena*

(ii) Porifera : Sponge spicules spongin fibers, gemmules

(iii) Coelenterata : *Obelia* colony

3. Diagrammatic representation of nervous system of pila and unio

Marks Distribution

SN	Exercises	Marks
1	Diagrammatic representation of nervous system	20
2	Permanent Preparation	15
3	Spots (8 x 3)	24
4	Viva voce	11
5	**Internal Assignment:-** Practical Record Overall Performance	 20 10
Total		**100**

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Recommended Books (All latest editions)

10. Prasad, Beni: *Pila*, Lucknow Publishing House, Lucknow.
11. Bhatia, M. L.: *Hirudinaria*, Lucknow Publishing House, Lucknow.
12. Kotpal, R. L. :*Invertebrates*, Rastogi Publications, Meerut.
13. Nigam, H. C. :*A University Course in Invertebrate Zoology*, Vol. I, Mc Milan, London.
14. Prasad, S. N. :*Text Book of Invertebrate Zoology*, KitabMahal, Allahabad.
15. Patwardhan, S. S. :*Palaemon*, Lucknow Publishing House, Lucknow.
16. VishwaNath :*A Text Book of Zoology*, Vol. I, Invertebrate, S. Chand & Co., New Delhi.
17. Rastogi, Veerbala :*Invertebrate Zoology*, KedarNath Ram Nath, Delhi.
18. Jordan, E. L. and P. S. Verma: *Invertebrate Zoology*, S. Chand & Co. Ltd., Ram Nagar, NewDelhi.

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B.Sc. III Semester (ZOOLOGY) Examination, 2025

ZOO6001T : Biology of Non chordates

THEORY : Max. Marks: 100
PRACTICALS : Max. Marks: 100

Discipline Centric Core Course (DCC Course)

ZOO6001T : Chordate Structure and Function

Learning objective of the course

The course for the Taxonomy of chordates is exchanging the knowledge about with the principles of systematic and categorization of vertebrate organisms including their structure and function.

Unit 1: Classification and characters of phylum Chordata (excluding extinct forms) up to orders. Comparisons of habit, habitat, external features of *Balanoglossus*, *Herdmania* and *Branchiostoma* (excluding development).

Unit 2: Ascidian tadpole larva and its Metamorphosis, Affinities of Hemichordate, Urochordate and Cephalochordates, Habit, Habitat and salient features of *Petromyzon* and *Myxine* Ammocoete larva.

Unit 3: Integument including structure and development of placoid scales, feathers and hairs, Jaw suspensorium, limbs and girdles of *Rana*, *Uromastix*, *Columba* and *Oryctolagus*.

Unit 4: Heart and aortic arches, respiratory system and alimentary canal of *Scoliodon*, *Rana*, *Uromastix*, *Columba* and *Oryctolagus*.

Unit 5: Brain, urinogenital system (*Scoliodon*, *Rana*, *Uromastix*, *Columba* and *Oryctolagus*), Identification of poisonous and non poisonous snakes. Biting mechanism in snakes. flight adaptations in birds. Adaptations in aquatic mammals.

ZOO5002P Practical

1. Diagramatic Representation:

Major Scoliodon : General anatomy, alimentary canal

Minor afferent and efferent blood vessels, urinogenital system, brain and cranial nerves – V, VII, IX and X only and internal ear Brain V, VII, IX and X Cranial nerves, afferent and efferent blood vessels, air sacs, and internal ear.

2. PERMANENT PREPARATIONS

Scoliodon: Placoid scales, Ampulla of Lorenzini.

3. Identification, systematic position and comments of the following animals:

Cephalochordata: *Amphioxus*, Hemichordata: *Balanoglossus*

Urochordata: *Salpa*, *Doliolum* and *Herdmania*

Cyclostomata: Petromyzon and Myxine

Pisces: *Zygaena*, *Scoliodon*, *Pristis*, *Torpedo*, *Trygon*, *Protopterus*, *Labeo*, *Heteropneustis* (*Saccobranchus*), *Belone*, *Exocoetus*, *Anabas* and *Echeneis*

Amphibia: *Necturus*, *Amphiuma*, *Ambystoma*, *Axolotal larva*, *Hyla*, *Uraeotyphlus*

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Reptilia: *Trionyx,Chelone, Varanus, Uromastix, Ophiosaurus, Naja, Bungarus, Echis, Hydrophis, Eryx, Ptyas, Crocodilus* and *Gavialis*

Aves: *Columba, Pavo, Choriotis, Francolinus, Streptopelia*

Mammalia: *Meriones, Funambulus, Rattus, Hemiechinus, Suncus, Ptecopus, Presbytis* and *Macaca*

4. Microscopic Study

Hemichordata: Section through proboscis and branchiogenital region *Branch stoma:* T.S.oral hood, pharynx, gonads, intestine and caudal region *Scoliodon:* T.S. gill and scroll valve
Rana: T.S. through various organs, T.S. and L.S. of developmental stages
Reptilia: V.S.skin of lizard
Aves: V.S. skin, different types of feathers

Marks Distribution

SN	Exercises	Marks
1	Diagram of Major Dissection	15
2	Diagram of Minor Dissection	05
3	Permanent Preparation	15
4	Spots (8 x 3)	24
5	Viva – voce	11
6	**Internal Assignment:-** Practical Record Overall Performance	 20 10
Total		**100**

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List of Recommended Books

1. Das, S.M. : The Indian Zoological Memoirs, Herdmania, Lucknow Publishing House,Lucknow
2. Jorden, E.L. and Verma, P.S.; Chordate Zoology and Animal Physiology, S. Chand& Co., N. Delhi
3. Kotpal, R.L. : Chordate Zoology, Rastogi Publication, Meerut
4. Dalela, R.C. : A Text Book of Chordate Zoology, Jai Prakash Nath Publication,Meerut
5. Srivastava, M.D.L. : An Introduction to Comparative Anatomy of Vertebrates,Pothishala Ltd., Allahabad
6. Thiliayampalam, E.M. : Scoliodon, Lucknow Publishing House, Lucknow
7. Weichart, G.K. : Anatomy of the Chrodates, McGraw Hill, New York

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B.Sc. IIIrd Semester

ZOO6001S (SEC) : Zoology: Skill Course I – Vermitechnology

(30 hrs.)

THEORY :

Unit 1: General characteristics of earthworms; earthworm species diversity; ecological categories of earthworms.

Unit 2 : Breeding and culture methods; vermicomposting; chemical and biological properties of vermicompost.

Unit 3 : Use of earthworms in agricultural, industrial and household waste management; designing of various types of vermireactors.

PRACTICAL :

1. Study of systematic position, habit, habitat and external features of an earthworm species and its life cycle.
2. Preparation of vermiculture; maintenance of culture.
3. Preparation of vermicompost.

Suggested Reading Materials (All latest editions)

1. Edwards, C.A. Earthworm Ecology, CRC Press, The Netherlands.
2. Edwards, C.A. and Lofty, J.R. Biology of Earthworms, Champman & Hall, England.
3. Ismail, S.A. Vermicology, Orient Longman, Chennai, India.
4. Talashilkar, S.C. Vermitechnology, Khadigramodyog, Maharashtra, India.

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B.Sc. IV Semester (ZOOLOGY) Examination, 2025, 2026

ZOO6002T: Developmental Biology

THEORY : Max. Marks: 100
PRACTICAL : Max. Marks: 100

Discipline Centric Core Course (DCC Course)

ZOO6002T : Developmental Biology

Learning objective of the course

The course for the developmental biology of vertebrates is exchanging the knowledge about with the developmental processes and various events of development.

Unit 1:History and basic concepts of Embryology - Gametogenesis: Spermatogenesis and oogenesis. Structure and types of eggs and sperms. vitellogenesis

Unit 2: Fertilization – Main events of fertilization : Acrosome reaction, Polyspermy preventing mechanisms, Cleavage : Planes, patterns and types of cleavage. Blastulation: Types of blastulae Significance of cleavage and blastulation.

Unit 3: Gastrulation-Fate maps, morphogenetic cell movement and their significance in gastrulation. Development of *Branchiostoma (Amphioxus)* up to gastrulation; chick egg and its development up to the formation of primitive streak.

Unit 4: Extra embryonic membranes of chick. Placentation: definition,types, classification on basis of morphology & histology and functions of placenta. Development of placenta in rabbit.

Unit 5: Organogenesis of alimentary canal, eye and kidney, gonads and brain in mammal.

ZOO6002P : Developmental Biology

1. Study of Chick embryology: Whole mounts of embryos of 18, 24, 28, 33, 36, 48 and 72 hours.
2. Microscopic slides of lung, kidney, stomach, intestine, pancreas, gonad of Frog, *Uromastrix, Columba* and Rat.
3. Preparation of different development stages of Chick.
4. Study of cartilage development in limbs/whole embryos (8 to 12 days of incubation) by Alcian green stain.
5. *In vitro* culture of early chick embryos.

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Marks Distribution

SN	Exercise	Marks
1	Diagram of various stages of chick embryo	15
2	Spots (10 x 4)	40
3	Viva – voce	15
6	**Internal Assignment:-** Practical Record Overall Performance	 20 10
Total		100

Note: Each regular student is required to keep a record of practical work done by him/her duly checked by the teacher which will be submitted at the time of practical examination.

List of Recommended Books

1. Arey, L.B. : Developmental Anatomy, Asia Publishing House, Mumbai
2. Balinsky : Introduction to Embryology (CBS College Publishers)
3. Jain, P.C. : Text Book of Embryology, Vishal Publication, Jalandhar

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B.Sc. IVth Semester

ZOO6002S (SEC) : Zoology: Skill Course II – Pisciculture

(30 hrs.)

THEORY:

Unit 1 : Characteristics and classification of fishes, selection of major cultivable fishes for inland fresh water bodies; food and nutrition of fishes.

Unit 2 : Layout of fish ponds, gears and crafts; induced breeding, hypophysation techniques.

Unit 3 : Limnology of fresh water ponds i.e., alkalinity, salinity, dissolve gases and hardness; fish composition, preservation and packaging of fishes.

PRACTICAL :

1. Identifications of fishes.
2. Hypophysation technique for fishes.
3. Collection and identification of zoopalaktons.
4. Limanlogy of fish pond.

Suggested Reading Materials (All latest editions)

1. Day F. The Fauna of British India (Fishes), Vol I & II, Gobt of India Press (Delhi).
2. *Eugene W. Rice, Rodger B. Baird, Andrew D. Eaton* and *Lenore S. Clesceri*.APHA Standard Methods for Examination of Water and Wastewater. APHA, Washington DC.
3. *Brian Harvey*.Induced breeding in tropical fish culture. ITDG Publishing, Rugby, CV23 9QZ, UK.
4. *Paul J. B. Hart* and *John D. Reynolds*.Handbook of Fish Biology and Fisheries - I & II Vol. John Wiley & Sons Singapore Pvt. Ltd.

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B.Sc. V Semester (ZOOLOGY)Examination, 2025, 2026

ZOO7001T : Cell Biology and Genetics

THEORY : Max. Marks: 100
PRACTICAL : Max. Marks: 100

Discipline Specific Elective Course (DSE Course)

ZOO7001T - Cell Biology and Genetics

Learning objective of the course

The course for the cell biology and genetics is exchanging the knowledge about structure of cell organelles and basic idea of genetics.

Unit 1: Characteristics of prokaryotic and eukaryotic cells, Characteristics of cell membrane molecules, fluid-mosaic models of Singer and Nicolson, passive and active transport, Structures and functions of endoplasmic reticulum, ribosome, Golgi complex, lysosome, mitochondria, centriole, microtubules and nucleus.

Unit 2: Structure of Chromatin and Chromosomes, semiconservative mechanism of replication, elementary idea about topoisomerases, replication forks, leading and lagging strands, RNA primers and Okazaki fragments, RNA structure and types, mechanism of transcription, Genetic Code and protein synthesis.

Unit 3: Interphase nucleus and cell-cycle including regulation.

Mitosis: Phases and process of mitosis, structure and function of spindle apparatus, Theories of cytokinese.

Meiosis: Phases and process of meiosis, synaptonemal complex, formation and fate of chiasmata recombination and significance of crossing over.

Unit 4: Mendelism: Brief history of genetics and Mende''s work; Mendelian laws, their significance and current status, linked gene inheritance.

Chromosomal aberration: Structural - translocation, inversion, deletion and duplication; Numerical - haploidy, diploidy, polyploidy, aneuploidy, euploidy, polysomy and genetic implications.

Unit 5: Genetic interaction: supplementary genes, complementary genes, duplicate genes, multiple gene interaction, ABO blood groups and their genotypes, Multiple alleles.

ZOO7001P - Practical

1. Identifications of different stages of Mitosis.
2. Identifications of different stages of Meiosis.
3. Demonstration of amylase enzyme activity in animal tissue/saliva.
4. Determination of blood groups and Rh-factor.
5. Study of nucleus morphology of mammalian blood sample.
6. Osmotic effect of RBC
7. Problems regarding Mandal's laws (i) Monohybrid (ii) Dihybrid cross.

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8. Temporary acetocarmine squash preparations and study of chromosomes.

9. Experimental Zoology:
   Test for Protein : Biuret
   Test for Lipids : Sudan IV
   Test for Carbohydrates : Benedict's

10. Catalase enzyme activity

11. Osmotic effect of RBC

Marks Distribution

SN	Exercise	Marks
1	General exercise -1	08
2	General exercise- 2	08
3	Slide preparations	15
4	Spots (8 x 3)	24
5	Viva – voce	15
6	**Internal Assignment:-** Practical Record Overall Performance	 20 10
Total		**100**

Note: Each regular student is required to keep a record of practical work done by him/her duly checked by the teacher which will be submitted at the time of practical examination.

List of Recommended Books: (All latest editions)

1. Alberts, B. *et.al. The Cell* (Garland).

13. Lodish, H., *et.al. Molecular Cell Biology* (Freeman).

14. Gupta, P. K., Genetics, Rastogi Publications, Meerut.

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ZOO7002T : Animal Physiology and Biochemistry

THEORY : Max. Marks: 100
PRACTICAL : Max. Marks: 100

Discipline Specific Elective Course (DSE Course)

ZOO7002T - Animal Physiology and Biochemistry

Learning objective of the course

The course for the animal physiology is exchanging the knowledge about different systems and basic biochemistry.

Unit 1: Digestion; digestive enzymes, process of digestion, digestion of protein, carbohydrate and lipid

Blood: Composition and functions, Blood groups, Rh factor and their significance, blood clotting mechanism, blood pressure and cardiac cycle, respiratory pigments, cardiac muscle activity.

Unit 2: Muscle: Structure of various types of muscles and mechanism of muscle contraction

Excretion: Structure of kidney, types of nephron, mechanism of urine formation and its elimination and arginine, ornithin cycle.

Unit 3: Respiration: Structure of lung, mechanism of respiration, respiratory pigment, exchange and transport of oxygen and carbon dioxide.

Nervous System: Structure of neuron and its classification, Nerve impulse, impulse conduction and reflex action.

Unit 4: Endocrine glands: Structure and functions of various endocrine glands, diseases caused by hormonal deficiency; Mechanism of hormone action.

Unit 5: Structure of Protein and Carbohydrates; oxidation of glucose through glycolysis, Krebs cycle and oxidative phosphorylation, deamination, transamination and decarboxylation.

ZOO7002P Practical

1. Haemoglobin estimation of mammalian blood
2. Preparation of heamin crystals
3. Osmotic effect of R.B.C.
4. Preparation of mammalian blood film.
5. To determine the rate of oxygen consumption of rat
6. Analysis of urine for sugar, protein and pH
7. Estimation of E.S.R.
8. Estimation of packed cell volume [PCV]
9. Measurement of blood pressure
10. Determination of blood group and Rh Factor

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Marks Distribution

SN	Exercise	Marks
1	Exercise – 1	20
2	Exercise – 2	17
3	Spots (6 x 3)	18
4	Viva – voce	15
5	**Internal Assignment:-** Practical Record Overall Performance	 20 10
Total		100

Note: Each regular student is required to keep a record of practical work done by him/her duly checked by the teacher which will be submitted at the time of practical examination.

List of Recommended Books: (All latest editions)

1. Srivastava, H.S. : Elements of Biochemistry, Rastogi Publications, Meerut
2. Goel, K.A. and Shastry, K.B. : Animal Physiology, Rastogi Publication, Meerut
3. Dalela, R.C. : Animal Physiology, S. Chand & Co. Ltd., New Delhi
4. Agarwal, R.A., Srivastava, Anil Kumar and Kaushal Kumar: Animal Physiology andBiochemistry, S. Chand & Co. Ltd., New Delhi
5. Kulshrestha, V.V. : Experimental Physiology, Vikas Publishing House, New Delhi
6. Samasiviah, I. et.al. : Text Book of Animal Physiology and Ecology, S. Chand &Co. Ltd., New Delhi
7. Verma, P.S., Tyagi, B.S. and Agarwal, V.K.: Animal Physiology, S. Chand & Co.Ltd., New Delhi
8. Hoar, S.: General and Comparative Physiology, Prentice Hall of India Pvt. Ltd.
9. Wood, D.W.: Principles of Animal Physiology
10. Prosser, C.B.: Comparative Animal Physiology, Satish Book Enterprise
11. Eckert, Animal Physiology. (W.H. Freeman)

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B.Sc. Vth Semester
ZOO7001S(SEC):Zoology: Skill Course III – Medical Laboratory Technology

(30 hrs.)

THEORY:

Unit 1 : Collection, separation, preservation of biological samples; laboratory safety procedures; microscopy and spectrophotometry.

Unit 2 : Column chromatography; gel filtration; gel electrophoresis; acid, base and buffer; fixation, staining and mounting of tissues.

Unit 3: Classification of protein, carbohydrate and lipid; anticoagulants: preparation of different blood components for use; biochemistry of blood.

PRACTICAL :

1. Estimation of protein.
2. Estimation of DNA.
3. Preparation of buffer.
4. Blood groups detection.
5. Counting of RBC / WBC.

Suggested Reading Materials (All latest editions)

1. Harold, Varley : Varley's Practical clinical biochemistry. CBS.
2. Barbara J. Bain, Imelda Bates, Mike A Laffan, S. Mitchell Lewis Dacie and Lewis : Practical Haematology.
3. Kim S. Suvarna, Christopher Layton,John D. Bancroft : Bancroft's Theory and Practice of Histological Techniques. Churchill Livingstone, USA.
4. Keith Wilson (Editor), John Walker : Principles and Techniques of Biochemistry and Molecular Biology. Cambridge University Press. USA.
5. Richard Drake , A. Wayne Vogl , Adam W. M. Mitchell , Richard Tibbitts, Paul Richardson Gray's Atlas of Anatomy, 2e (Gray's Anatomy). Churchill Livingstone, USA.

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B.Sc. VI Semester (ZOOLOGY) Examination, 2026, 2027

ZOO7003T : Ecology and Behaviour

THEORY : Max. Marks: 100
PRACTICAL : Max. Marks: 100

Discipline Specific Elective Course (DSE Course)

ZOO7003T - Ecology and Behaviour

Learning objective of the course

The course for the Ecology and Animal behavior is exchanging the knowledge about animal habitat and various behavioral activities.

Unit 1: Introduction of ecology, definition, history, sub division and scope of ecology. Environmental factors; physical factors- soil, water, air and temperature. Biotic factors-interspecific and intraspecific relations, neutralism, mutualism, commensalism, antibiosis, parasitism, predation, competition. Concept of limiting factors, Liebig's law of minimum, Shelfords law of tolerance, combined concept of limiting factors.

Unit 2: Population and community ecology, measurement of population density. Factors affecting population growth, growth factors, dispersal, characteristic of community, concept of ecosystem and niches.
Food chain, food web, Ecological pyramid. Energy flow in an ecosystem, biogeochemical cycles of CO_2, N_2, O_2, S and P. Prospects and strategies of sustainable development.

Unit 3: Brief introduction to the major ecosystem of the world and ecological succession, conservation of natural resources; Ecology in relation to Thar desert.
Brief account of environmental pollution, global warming and its impact upon Human race.

Unit 4: General survey of various types of animal behaviour. Methods of studying animal behaviour, Role of hormones and pheromones in behaviour, Biological rhythms.

Unit 5: Learning and Memory – Conditioning, Habituation, Insight learning, Association learning, Reasoning and Communication; Wildlife of Rajasthan and its conservation.

ZOO7003T - Practical

1. Demonstration of working of pH meter.
2. Demonstration of working of colorimeter.
3. Estimation of pH of Soil and water samples.
4. Measurement of temperature and relative humidity.
5. Estimation of soil moisture.
6. Estimation of water holding capacity of different soils.
7. Ecosystem study : Aquarium.
8. Pond water study to identify zoo-planktons and their permanent preparations
9. Chemotaxis activity of cockroach
10. Phototaxis activity of tribolium

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Marks Distribution

SN	Exercise	Marks
1	Exercise	20
2	Permanent Preparations	15
3	Spots (8 x 3)	24
4	Viva – voce	11
5	**Internal Assignment:-** Practical Record Overall Performance	 20 10
Total		100

Note: Each regular student is required to keep a record of practical work done by him/her duly checked by the teacher which will be submitted at the time of practical examination.

List of Recommended Books:(All latest editions)

1. Odum : Ecology (Amerind)
2. Odum : Fundamentals of Ecology (W.B. Saunders)
3. Ricklefy: Ecology (W.H. Freeman)
4. Turk and Turk: Environmental Science (W.B. Saunders)
5. Natarajan, P. , Arumugam,N.: Animal Behaviour
6. Mathur, Reena : Animal Behaviour
7. Agarwal, V.K. : Animal Behaviour
8. Prasad, S. : Animal Behaviour

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ZOO7004T : Applied Zoology

THEORY : Max. Marks: 100

PRACTICAL : Max. Marks: 100

Discipline Specific Elective Course (DSE Course)

ZOO7004T - Applied Zoology

Learning objective of the course

The course for the Applied Zoology is exchanging the knowledge about application of Zoology in society and well being.

Unit 1: Poultry keeping – Types of poultry breeds, poultry housing, farm and farm management, system of poultry farming; Grading, handling and marketing of eggs. Poultry diseases and Vermiculture: Methodology and products.

Unit 2: Sericulture : Different kinds of silk producing insects in India and its potentialities. Host plants of silk insects. Grainage, rearing and life cycle. Breeding and various diseases of silkworm. Reeling and fibre technology. Economics of sericulture.

Unit 3: Apiculture : Different kinds of honey bees found in India and, their identification. Identification of Queen, worker and drone. Importance of keeping bees in artificial hives and different kinds of hives. Care and management of bee colonies. Bee enemies and their control. Extraction and processing of honey from the comb. Utility and economics of production of honey. Honey bees and pollination strategy in agricultural crops.

Unit 4: Pest Management : Insect pests of important crops (cotton, Rice, sugar cane& pulses), insect pest of veterinary and medical importance, pest outbreaks and assessment of losses caused by the insect pests on crops; population dynamics of insect pests; Principles of Biological, mechanical and cultural methods of pest control.Integrated Pest Management (IPM). Principles of pest control by pesticides.

Important vertebrate pests; birds and mammals with special reference to rodents and their management.

Unit 5: General principles of aquaculture; transportation of fish seed and broodees. Induced Breeding. Composite fish culture, Lay out of fish farm and its management, By-products of fishing industry; Prawn culture; Management of water bodies for aquaculture.

ZOO7004P – Practical

1. Study of different spraying and dusting equipment.
2. Use of pesticides and precautionary measures.
3. Permanent preparation of any two stored grain pests.
4. Permanent Preparation and Identification of parasitic insects.
5. Honey bee : Permanent preparation of pollen basket and mouth parts
6. Permanent preparation of mouth parts of mosquito, termites and cockroach
7. Model/ Project report based upon study of Poultry keeping/ Sericulture/ Apiculture/ Pest Management
8. Diagrammatic representation of nervous system of cockroach

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Marks Distribution

SN	Exercise	Marks
1	Diagrammatic representation of nervous system	15
2	Permanent Preparation - 2	10
3	Spots (8 x 3)	24
4	Viva – voce	11
5	Project report	10
6	**Internal Assignment:-** Practical Record Overall Performance	 20 10
Total		100

Note: Each regular student is required to keep a record of practical work done by him/her duly checked by the teacher which will be submitted at the time of practical examination.

List of Recommended Books:(All latest editions)

1. Parihar, R.P.: Fish Biology and Indian Fisheries, Central Publication House, Allahabad
2. Kovaleve, P.A.: Silkworm Breeding Stocks, Central Silk Board, Marine Drive, Mumbai
3. Roger, A. Morse, The ABC and XYZ of Bee Culture, A.I. Root & Co., Medina, Ohio44256.
4. Metcalf C.L. and W.P. Flint, Destructive and Useful Insects, Tata McGraw Hill Publishing Co. Ltd., New Delhi – 110 051
5. Nayar, B.V., Pest Management and Pesticides Indian Scenario, Namratha Publications, Madras

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B.Sc. VIth Semester
ZOO7002S(SEC):Zoology: Skill Course IV – Eco-wildlife Tourism

(30 hrs.)

THEORY:
Unit 1 : Climate and wildlife of desert; cultural heritage; bird watching; wildlife trekking; desert National Park.
Unit 2 : Fauna of Thar desert and its conservation; sacred grove; role of humans in environmental protection.
Unit 3 : Environmental impacts with special reference to wildlife; environmental awareness; clean India campaign.

PRACTICAL :
1. Study of wildlife rich area, Jodhpur fort, other sites of cultural heritage, local field visit to carry out assignment.
2. skill development for nature interpretation.
3. Trekking and camp managing.
4. Identification of local fauna.

Suggested Reading Materials (All latest editions)

1. Pathak, R. Indian National Park. Sumit Enterprises, New Delhi.
2. Samuel Israel and Toby Sinclari. Indian Wildlife, APA Production, Singapore.
3. Prater, S.H. The Book of Indian Animals. BNHS, Mumbai.
4. Krishnan, M. The Handbook of India's Wildlife. Maps and Hygiene Publisher, Chennai.

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