SYLLABUS FOR FOUR YEAR INTEGRATED B.Sc. B.Ed. COURSE

FIRST YEAR

2025 – 26

JAI NARAIN VYAS UNIVERSITY
JODHPUR

ZOOLOGY

Course	Nomenclature	Marks Per Paper/ Practical Board	Number ofPeriods per week	Internal Marks	University Examination Marks	Total for the Year	Min. Pass Marks
Paper I	Animal Diversity and Evolution	Theory 50	2	Theory 10	Theory 40	50	40
Paper II	Biology of Non chordates	Theory 50	2	Theory 10	Theory 40	50	
PRACTICAL COURSE (One Board)		Practical 50	3 X 2	Practical record Marks 10	Practical 40	50	20

Duration of examination of each theory paper 3 hours
Duration of examination of practical (for both papers on same day) 4 hours

Note: Each theory paper is divided in three parts i.e. Section-A, Section –B and Section –C.

Section-A: Will consist of 10 compulsory questions. There will be two questions from each unit and answer of each question shall be limited up to 30 words. Each question will carry1 mark.

Section –B: Will consist of 10 questions. There will be two questions from each unit. Students will have to answer one question from each unit. Answer of each question shall be limited up to 250 words. Each question will carry 3 marks.

Section-C: Will consist of total 05 questions. There will be one question from each unit. Students will have to answer any 03 questions and answer of each question shall be limited up to 500 words. Each question will carry 5 marks.

PAPER I

Animal Diversity and Evolution

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.

PAPER II

Biology of Nonchordates

Unit 1: *Euglena:* Ultrastructure of flagellum and flagellar movement, osmoregulation and behaviour, 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 and developmental 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.

PRACTICALS

1. Dissection of given Animals
   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
2. Permanent preparations : Protozoa: *Paramecium Porifera*: Sponge spicules, fibres and gemmules Coelenterata: *Obelia* colony, *Obelia* medusa
   Annelida: *Nereis* parapodia
   Arthropoda: *Palaemon*: Statocyst and hastate plate along with comb plates, *Cyclops* and *Daphnia*
   Mollusca: *Pila*: Gill lamella, radula and L. S. Osphradium, *Lamellidens*: Gill-lamella
3. Identification, systematic position up to order and general study of the following animal forms, microscopic slides / museum specimens:

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

   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*

4. Study of sections, developmental stages and isolated structures from microscopic slides
   Porifera: L. S. and T. S. of *Scypha* / *Grantia*
   Coelenterata: *Hydra,* Sections of *Hydra,* Obelia

   Platyhelminthes: Transverse sections of *Dugesia, Fasciola* and *Taenia*, mature and gravid proglottids of *Taenia*, developmental stages of *Fasciola* and *Taenia* Annelida:Transverse sections of *Nereis* and *Hirudinaria*, Trochophore larva of Nereis, Parapodium of *Nereis* and *Heteronereis.*
   Arthropoda: Crustacean larvae (*Nauplius, Zoea, Megalopa* and *Mysis*), mosquito larva & pupa. Mollusca: Transverse sections of *Lamellidens* and Glochidium larva
   Echinodermata: Pedicellariae of Star fish
   Each regular student is required to keep a record of practical work done by him/her duly checked by the teachers which will be submitted at the time of practical examinations.

Maximum Marks: 50 Minimum Pass Marks: 20

Each regular student is required to keep a record of practical work done by him/her duly checked bythe teachers which will be submitted at the time of practical examinations.

Distribution of Marks:

		Regular	Ex.
Dissection		12	21
Permanent preparation		04	05
Spots (7x2)		14	14
Viva-voce		10	10
		40	50
Internal Assessment :	Practical record	10	--
	Total	50	50

Recommended Books (All latest editions)

1. Prasad, Beni: *Pila*, Lucknow Publishing House, Lucknow.
2. Bhatia, M. L.: *Hirudinaria*, Lucknow Publishing House, Lucknow.
3. Kotpal, 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. Patwardhan, 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, New Delhi.

SYLLABUS FOR FOUR YEAR INTEGRATED B.Sc. B.Ed. COURSE

SECOND YEAR

2026 – 27

JAI NARAIN VYAS UNIVERSITY
JODHPUR

ZOOLOGY

Course	Nomenclature	Marks Per Paper/ Practical Board	Number ofPeriods per week	Internal Marks	University Examination Marks	Total for the Year	Min. Pass Marks
Paper I	Chordate Structure andFunction	Theory 50	2	Theory 10	Theory 40	50	60
Paper II	Developmental Biology	Theory 50	2	Theory 10	Theory 40	50	
PaperIII	Immunology, Microbiology and Biotechnology	Theory 50	2	Theory 10	Theory 40	50	
PRACTICAL COURSE (One Board)		Practical 75	3 X 2	Practical Record Marks 15	Practical 60	75	30

Duration of examination of each theory paper 3 hours
Duration of examination of practicals 4 hours

Note: Each theory paper is divided in three parts i.e. Section-A, Section –B and Section –C.

Section-A: Will consist of 10 compulsory questions. There will be two questions from each unit and answer of each question shall be limited up to 30 words. Each question will carry of 1 mark.

Section –B: Will consist of 10 questions. Each unit will be having two questions;students will answer one question from each Unit. Answer of each question shall be limited up to 250 words. Each question carries 3 Marks.

Section-C: will consist of total 05 questions. Students will answer any 03 questionsand answer of each question shall be limited up to 500 words. Each question carries 5 Marks.

PAPER I
Chordate Structure and Function

Unit 1: Classification and characters of phylum Chordata (excluding extinct forms) upto orders, Comparisons of habit, habitat, external features and anatomy 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, Ammocoete larva.

Unit 3: Integument including structure and development of placoid scales, feathersand 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. Bitingmechanism in snakes, flight adaptations in birds. Adaptations in aquatic mammals.

PAPER **II**
Developmental Biology

Unit 1: Formation of egg and sperm, vitellogenesis and fertilization. Types of eggs and sperms, parthenogenesis, regeneration.

Unit 2: Planes and patterns of cleavage in chordates, significance of cleavage and blastulation, Morphogenetic cell movement, Fate maps and significance of gastrulation.

Unit 3: Development of *Branchiostoma* (*Amphioxus*) up to gastrulation; chick egg and its development up to the formation of primitive streak, Extra embryonic membranes of chick, development of placenta in rabbit, types and functions of placenta in mammals.

Unit 4: Various types of stem cells and their applications (with special reference to embryonic stem cells),Cloning of animals: nuclear embryonic transfer technique, nuclear transfer technique; Identical, Siemese and fraternal twinsand Artificial insemination.

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

PAPER III

Immunology, Microbiology and Biotechnology

Unit 1: Types of immunity (innate and acquired, humoral and cell mediated), Antigen: Antigenicity of molecules, haptens, Antibody: Structure and functions of each class of immunoglobulins (IgG, IgM, IgD, IgA and IgE), antigen – antibodyreactions.

Unit 2: Theory of spontaneous generation; Germ theory of fermentation and diseases: Works of Louis Pasteur, John Tyndal, Rober-Koch and Jenner, Bacteria: Cell membrane, patterns of arrangement; structure of capsule and cell envelops; organization of cytoplasmic membrane of Gram - negative and Gram - positive strains, Genetic material of bacteria: (i) Chromosome (ii) Plasmids.

Unit 3: Asexual and sexual reproduction in Bacteria ,Culture of Bacteria: Carbon and energy source, Nitrogen and minerals and Organic growth factors, Effect of environmental factors on bacterial culture: Temperature, hydrogen ion concentration; Medical importance of Gram-negative and Gram-positive bacteria.

Unit 4: Recombinant DNA technology: Introduction and principles, restriction endonucleases, cloning vehicles (plasmids, bacteriophages); methods of gene transfer and applications.

Unit 5: Environmental Biotechnology (outline idea only): Metal and petroleum recovery, pest control, waste-water treatment, Food, Drink and Dairy Biotechnology (outline idea only): Fermented food production: dairy products, alcoholic beverages and vinegar: microbial spoilage and food preservation.

Practical

1. Study of microbes in food material (like curd, etc.)
2. Bacteria culture
3. DISSECTION

   Scoliodon : General anatomy, alimentary canal, afferent and efferent blood vessels, urinogenital system, brain and cranial nerves – V, VII, IX and X only and internal ear *Labeo / Wallago,* Brain V, VII, IX and X Cranial nerves, afferent and efferent blood vessels, air sacs, and internal ear.
4. OSTEOLOGY
   Articulated and disarticulated skeleton of *Rana, Varanus, Gallus* and *Oryctolagus*
5. PERMANENT PREPARATIONS
   Scoliodon: Placoid scales, Ampulla of Lorenzini.
6. Identification, systematic position and comments of the following animals:
   Hemichordata: *Balanoglossus*

Urochordata: *Salpa, Doliolum* and *Herdmania*
Cephalochordata: Petromyzon and Myxine
Pisces: *Zygaena, Scoliodon, Pristis, Torpedo, Trygon, Protopterus, Labeo, Heteropneustis* (*Saccobranchus*), *Belone, Exocoetus, Anabas* and *Echeneis* Amphibia: *Necturus, Amphiuma, Amblystoma, Axolotal larva, Hyla, Uraeotyphlus*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*

7. 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
Chick embryology: Whole mounts of embryos of 18, 24, 33, 48 and 72 hours
Mammalia: T.S. through various organs

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.

Distribution of Marks:

Maximum Marks: 75 Minimum Pass Marks: 27

	Regular	Ex.
Dissection	14	24
Permanent preparation	10	10
Spots (8x2)	16	16
Experimental Zoology	10	15
Viva-voce	10	10
	60	75
Internal Assessment : Practical record	15	--
Total	75	75

List of Recommended Books

1. Arey, L.B. : Developmental Anatomy, Asia Publishing House, Mumbai
2. Chopra, V.L. : Genetic Engineering and Biotechnology, Oxford & I.B.H., New Delhi
3. Das, S.M. : The Indian Zoological Memoirs, Herdmania, Lucknow Publishing House, Lucknow
4. Jorden, E.L. and Verma, P.S.: Chordate Zoology and Animal Physiology, S. Chand& Co., N. Delhi
5. Kotpal, R.L. : Chordate Zoology, Rastogi Publication, Meerut
6. Dalela, R.C. : A Text Book of Chordate Zoology, Jai Prakash Nath Publication,Meerut
7. Bhatia, A., Jain, N. and Kohli, N.S.: An outline of Biotechnology, Ramesh BookDepot, Jaipur
8. Balinsky : Introduction to Embryology (CBS College Publishers)
9. Kuby : Immunology (W.H. Freeman)
10. R.A. Meyers (Ed.) : Molecular Biology and Biotechnology (VCH Publishers)
11. Jain, P.C. : Text Book of Embryology, Vishal Publication, Jalandhar
12. Srivastava, M.D.L. : An Introduction to Comparative Anatomy of Vertebrates, Pothishala Ltd., Allahabad
13. Thillayampalam, E.M. : Scoliodon, Lucknow Publishing House, Lucknow
14. Weichart, G.K. : Anatomy of the Chrodates, McGraw Hill, New York
15. Lewis, C.D. and Lewin, R., Biology of Gene, McGraw Hill, Toppan Co. Ltd.
16. Winchester, Genetics, Oxford IBH Publications
17. Agarwal, R.A., Srivastava, Anil Kumar and Kaushal Kumar: Animal Physiology and Biochemistry, S. Chand & Co. Ltd., New Delhi.

SYLLABUS FOR FOUR YEAR INTEGRATED B.Sc. B.Ed. COURSE

THIRD YEAR

2027 – 28

JAI NARAIN VYAS UNIVERSITY
JODHPUR

ZOOLOGY

Course	Nomenclature	Marks Per Paper/ PracticalBoard	Number ofPeriods per week	Internal Marks	University Examination Marks	Total for the Year	Min. Pass Marks
Paper I	Cell Biology and Genetics	Theory 50	2	Theory 10	Theory 40	50	40
Paper II	Animal Physiology and Biochemistry	Theory 50	2	Theory 10	Theory 40	50	
PRACTICAL COURSE (One Board)		Practical 50	3 X 2	Practical Record Marks 10	Practical 40	50	20

Duration of each theory paper 3 hours
Duration of practical examination 4 hours

Note: Each theory paper is divided in three parts i.e. Section-A, Section –B and Section – C.

Section-A: Will consist of 10 compulsory questions. There will be two questions fromeach unit and answer of each question shall be limited up to 30 words. Each questionwill carry 1 mark.

Section–B: Will consist of 10 questions. There will be two questions from each unit; students will have to answer one question from each Unit. Answer of each question shall be limited up to 250 words. Each question will carry 3 marks.

Section-C: will consist of total 05 questions. There will be one question from each unit. Students will have to answer any 03 questions and answer of each question shall be limited up to 500 words. Each question will carry 5 marks

PAPER I

Cell Biology and 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 spindleapparatus, Theories of cytokinese.

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

Unit 4: Mendelism: Brief history of genetics and Mendel'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.

PAPER II

Animal Physiology and 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.

Practical

1. Test for protein, lipid and carbohydrate.
2. Temporary acetocarmine squash preparation of chromosomes
3. Haemoglobin estimation of mammalian blood
4. Preparation of heamin crystals
5. Osmotic effect of R.B.C.
6. Preparation of mammalian blood film and identification of different types of blood cells
7. Determination of blood groups and Rh-factor
8. To determine the rate of oxygen consumption of rat
9. Analysis of urine for sugar, protein and pH
10. Estimation of E.S.R.
11. Demonstration of amylase activity
12. Estimation of packed cell volume [PCV]
13. Demonstration of working of pH meter
14. Demonstration of working of colorimeter
15. Measurement of blood pressure

List of Recommended Books:

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 and Biochemistry, 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)
12. Alberts, B. *et.al*. *The Cell* (Garland).
13 Lodish, H., *et.al*. *Molecular Cell Biology* (Freeman).
14 Gupta, P. K., Genetics, Rastogi Publications, Meerut.
15 Rastogi, Veer Bala, Cell Biology, Kedar Nath Ram Nath, Delhi.

16 De Robertis, E. D. P. and De Robertis, E. M. F.: *Cell and Molecular Biology*, Halt Saunder, Tokyo, Japan.

17 Gardner, E. J.: *Principles of Genetics*, John Wiley & Sons, New York.

18 Verma, P.S.: Textbook of cell biology.

19 Verma, P.S.: Textbook of genetics.

20 Gupta, P.K.: Textbook of cell biology.

Distribution of Marks:

Maximum Marks: 50 Minimum Pass Marks: 18

	Regular	Ex.
Physiological experiment	10	15
Spots (5x2)	10	10
Biochemical test/cell division experiment	10	15
Viva-voce	10	10
	40	50
Internal Assessment: Practical record	10	--
Total	50	50

SYLLABUS FOR FOUR YEAR INTEGRATED B.Sc. B.Ed. COURSE

FOURTH YEAR

2028 – 29

JAI NARAIN VYAS UNIVERSITY
JODHPUR

ZOOLOGY

Course	Nomenclature	Marks Per Paper/ PracticalBoard	Number ofPeriods per week	Internal Marks	University Examination Marks	Total for the Year	Min. Pass Marks
Paper I	Ecology and Behavior	Theory 50	2	Theory 10	Theory 40	50	40
Paper II	Applied Zoology	Theory 50	2	Theory 10	Theory 40	50	
PRACTICAL COURSE (One Board)		Practical 50	3 X 2	Practical Record Marks 10	Practical 40	50	20

Duration of each theory paper 3 hours
Duration of practical examination 4 hours

Note: Each theory paper is divided in three parts i.e. Section-A, Section –B and Section-C.

Section-A: Will consist of 10 compulsory questions. There will be two questions fromeach unit and answer of each question shall be limited up to 30 words. Each questionwill carry 1 mark.

Section–B: Will consist of 10 questions. There will be two questions from each unit; students will have to answer one question from each Unit. Answer of each question shall be limited up to 250 words. Each question will carry 3 marks.

Section-C: will consist of total 05 questions. There will be one question from each unit. Students will have to answer any 03 questions and answer of each question shall be limited up to 500 words. Each question will carry 5 marks.

PAPER I

Ecology and Behaviour

Unit 1: Introduction of ecology, definition, history, sub division and scope of ecology. Envirnmental 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, Shelford's 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 stratigies 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 behavior; Methods of studying animal behavior, Role of hormones and pheromones in behavior, Biological rhythms.

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

PAPER II
Applied Zoology

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 brooders,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.

Practical

1. Study of different spraying and dusting equipment
2. Study of pesticides and precautionary measures
3. Measurement of temperature and relative humidity
4. Estimation of soil moisture
5. Estimation of water holding capacity of different soils
6. Ecosystem study: Aquarium
7. Pond water study to identify zoo-planktons and their permanent preparations
8. Permanent preparation of any two stored grain pests. Two parasitic insects and termites
9. Honey bee: Permanent preparation of pollen basket and mouth parts
10. Permanent preparation of mouth parts of butterfly, moth, mosquito and cockroach
11. Project report based upon study of local fauna

Distribution of Marks:

Maximum Marks: 50 Minimum Pass Marks: 18

	Regular	Ex.
Experiment - I	08	15
Experiment - II	08	15
Spots (4x2)	08	08
Project report on local Fauna	07	--
Permanent preparation	04	04
Viva-voce	05	08
	40	50
Internal Assessment: Practical record	10	--
Total	50	50

List of Recommended Books:

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, Ohio 44256.
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