

UNIVERSITY OF MYSORE
Syllabus for B.Sc. (SEP Scheme) 2026-27
SUBJECT: ZOOLOGY
OVERVIEW

Semester	Code	Course title	Theory (Credits)	Tutorials	Practical (Credits)	Total Credits	Marks			
							C1	C2	C3	Total
I	DSC1A	Animal diversity-I (Non Chordata)	3	0		3	10	10	80	100
		Practical – I (Non Chordata)	-	-	2	2	5	5	40	50
II	DSC1B	Animal diversity-II (Chordata)	3	0		3	10	10	80	100
		Practical – II (Chordata)	-	-	2	2	5	5	40	50
III	DSC1C	Biochemistry and Physiology	3	0		3	10	10	80	100
		Practical – III (Biochemistry, Physiology)	-	-	2	2	5	5	40	50
	Elective-1	Histology	2	0	-	2	5	5	40	50
	Elective-2	Endocrinology	2	0	-	2	5	5	40	50
IV	DSC1D	Cell and Developmental Biology	3	0		3	10	10	80	100
		Practical –IV (Cell and Developmental Biology)	-	-	2	2	5	5	40	50
	Elective 1	Applied Zoology	2	0	-	2	5	5	40	50
	Compulsory paper	Skill Enhancement in Zoology	-	-	2	-	5	5	40	50
V	DSC1E	Paper-5 Genetics and Animal Biotechnology	3	0		3	10	10	80	100
		Paper-6 Ethology, Evolution And Biostatistics	3	0		3	10	10	80	100
		Practical –V (Genetics and Evolution)	-	-	2	2	5	5	40	50
	Compulsory paper	Skill Enhancement in Zoology	-	-	2	2	5	5	40	50
VI	DSC1F	Paper-7 Environmental Biology, Wildlife Management and Conservation	3	0		3	10	10	80	100
		Paper-8 Molecular Biology And Immunology	2	-	-	2	5	5	40	50
		Practical- VI Environmental biology, wildlife conservation and Molecular Biology	-	-	2	2	5	5	40	50
	Compulsory paper	Skill Enhancement in Zoology	-	-	2	2	5	5	40	50

C1- IA Assignment for 10 marks

C2 –IA Test for 10 marks

C3- 80 marks (3 hrs.)

Practical: C1 –Assignment/ Report for 05 marks,

C2 –IA Test for 05 marks

C3- 40 marks (3 hrs)

V –SEMESTER Credit=03

PAPER V- GENETICS AND ANIMAL BIOTECHNOLOGY

3hrs/ week X 16= 48 hours

Theory Exam= 80 marks; Theory IA= 20 marks

Total = 100 Marks

UNIT I

- 16Hrs.

Introduction to Genetics: Definition- Genotype and Phenotype, **Mendel's Laws**, Monohybrid and Dihybrid crosses, Back cross and Test cross.

Non-Mendelian inheritance: Incomplete dominance (*Mirabilis jalapa*), Cytoplasmic inheritance (ex: Kappa particles in *Paramecium*), Maternal inheritance (ex: Shell coiling in *Limnaea*).

Nature and Nurture: Definition. Experiments on *Potentillaglandulosa*, Himalayan albino rabbit and Human twins. Definition of norm of reaction, Homeostasis, Phenocopy, Penetrance and Expressivity with examples – Huntington's chorea, PTC.

Interaction of genes:

Supplementary factors – 9: 3: 3: 1 - comb pattern in fowls.

Epistasis - 13: 3 - Plumage colour in Leghorn and Wyandotte,

Complementary factors - 9: 7 - Flower colour in sweet peas.

Polygenic inheritance - Skin colour in man.

Lethal genes – Yellow coat colour in mice.

Multiple Alleles: ABO blood groups in man, Rh-factor. Pleiotropism.

UNIT II

- 16Hrs.

Linkage: Definition, Linkage and crossing over in *Drosophila* -2 point test cross. Genetic maps-- Construction of genetic maps -3 point test cross in *Drosophila* (scec cv).

Sex linked inheritance: Sex linked inheritance in *Drosophila* (white eye colour) and man (Haemophilia and Colour blindness), Y-linked genes.

Sex determination: Chromosomal basis of sex determination (XX-XY, XX-XO and ZZ-ZW). Primary and secondary Non- disjunction, Genic balance theory in *Drosophila*. Gynandromorphs and Intersexes in *Drosophila*, Klinefelter's and Turner's Syndromes in man. Environmental and hormonal effects on determination of sex in *Bonellia*, Free martin in cattle.

Gene mutation: Definition, Disorders due to mutant genes in man: Brachydactyly, Sickle cell anaemia, Thalassaemia.

Mutagens- Physical and chemical agents. The ClB technique for detection of sex-linked recessive mutations. Inborn errors of metabolism: phenylketonuria, alkaptonuria, albinism.

Human Genetics: Eugenics and Euphenics. Human genomics – meaning, advantages and disadvantages. Epigenetics

Unit III

16Hrs

Animal tissue culture: Introduction, history and importance. Cell Culture procedures. Recombinant DNA Technology: Introduction. Steps involved.

Genetic Engineering: Nucleic acid modifying enzymes; Definitions, types (Restriction Enzymes and Ligases) and functions.

Animal tissue culture media: Culture media containing naturally occurring ingredients, blood plasma, blood serum, serum-free media, tissue extracts, complex natural media, chemically defined media

Gene cloning Vector: Concept and applications of plasmids-pBR322, Lambda phage vectors, Cosmids, Production of Human Recombinant insulin, Hybridoma technology: Synthesis and applications of Monoclonal Antibodies Cloning- Sheep, Transgenic animal- Fish, Cow, Zebra fish. Bio vaccines,

Gene transfer techniques- Physical, Chemical and Biological method (one from each). Gene silencing (Knock out and Knock in mouse); Gene Therapy (SCID).

References:

- B. Singh and S. K. Gautam – Textbook of Animal Biotechnology
- K. Srivastava – Animal Biotechnology
- Ashish S. Verma and Anchal Singh – Animal Biotechnology: Models in Discovery and Translation
- Birbal Singh, Gorakh Mal, Sanjeev K. Gautam and Manishi Mukesh – Advances in Animal Biotechnology
- R. Renaville and A. Burny – Biotechnology in Animal Husbandry
- Robert H. Tamarin – Principles of Genetics
- Peter J. Russell – iGenetics: A Molecular Approach
- Benjamin A. Pierce – Genetics: A Conceptual Approach
- T. A. Brown – Gene Cloning and DNA Analysis: An Introduction
- James D. Watson, Tania A. Baker, Stephen P. Bell, Alexander Gann, Michael Levine and Richard Losick – Molecular Biology of the Gene
- Singh & S.K. Gautam – Textbook of Animal Biotechnology
- A.K. Srivastava – Animal Biotechnology
- Robert H. Tamarin – Principles of Genetics

V –SEMESTER Credit=03

PAPER VI- ETHOLOGY, EVOLUTION AND BIOSTATISTICS

03hrs/ week X 16= 48 hours

Theory Exam = 80 marks; Theory IA= 20 marks

Total = 100 Marks

Unit I

16Hrs.

Ethology- Definition of animal behavior with examples: Innate behavior – taxes, reflexes, instincts and motivation. Learned behavior- habituation, imprinting, conditioned reflexes and insight learning

Fish migration: Salmon and Eel.

Bird migration: Advantages, Causes, Patterns, Mechanics and preparation for bird migration.

Biological Clock: Circadian, Circannual and Circalunar rhythms. Role of pineal gland and hypothalamus in biological rhythms.

Unit II

16Hrs.

Population genetics and Evolution: Mendelian population, gene pool and gene frequency, Hardy-Weinberg law – genetic equilibrium, Factors influencing allele frequency – natural selection, mutation, meiotic drive, migration, random genetic drift. Founder principle.

Organic Evolution: Concept of Organic evolution: Lamarckism, Darwinism, Neo- Lamarckism, Neo-Darwinism, modern synthetic theory and molecular evolution.

Evidences for organic evolution: Indirect evidences; From comparative morphology, and anatomy-homologous, analogous and vestigial organs. Physiology and biochemistry – enzymes, hormones, serology, amino acid sequence analysis, excretory product analysis. Embryological evidences. Connecting links (Peripatus, Neopilina, Neoceratodus, Archaeopteryx),

Direct evidences from palaeontology – Nature, types of fossils. Brief account of Dinosaurs (Stegosaurus and Brontosaurus).

Unit III

16Hrs.

Biostatistics: Measures of central tendency: Mean, Median, Mode.

Data summarizing: Frequency distribution, Graphical presentation – Line diagram, Pie diagram, Bar diagram and Histogram.

Measures of dispersion: Range, Standard Deviation, Standard error, Variance.

Tests of significance: F-test, t-test and Chi square test.

References:

- N. Tinbergen – The Study of Instinct
- John Alcock – Animal Behavior: An Evolutionary Approach
- Aubrey Manning and Marian Stamp Dawkins – An Introduction to Animal Behaviour
- Robert Trivers – Social Evolution

- Charles Darwin – On the Origin of Species
- Douglas J. Futuyma and Mark Kirkpatrick – Evolution
- Monroe W. Strickberger – Evolution
- P. S. Verma and V. K. Agarwal – Biostatistics, Genetics and Evolution
- Jerrold H. Zar – Biostatistical Analysis
- Wayne W. Daniel and Chad L. Cross – Biostatistics: A Foundation for Analysis in the Health Sciences

PRACTICAL-V

Credit-02

GENETICS, EVOLUTION AND BIOSTATISTICS 16 x 4 = 64 Hrs.

Practical Proper =40 Marks; Practical-IA = 10 Marks

Total = 50 Marks

1. General morphology of *Drosophila* and Identification of wild (male & female).
2. Mounting of sex comb and wing of *Drosophila*.
3. Identification of different types of mutants in *Drosophila* – white eye, bar eye, sepia eye, vestigial wing and ebony body.
4. Genetic problems: Monohybrid inheritance- *Drosophila* example. Dihybrid inheritance- *Drosophila* example.
5. Complementary genes: Flower colour in sweet pea.
Supplementary genes: Comb pattern in fowls.
Epistasis: Plumage colour in fowls.
6. Sex linked inheritance: *Drosophila* and Man (One problems in each). Polygenes: Skin colour in Man.
7. Multiple alleles: ABO blood group in humans (Two problems)
8. Linkage: Two point test cross-two problems.
9. Calculation of allelic frequency using ABO blood group in humans
10. Calculation of allelic frequency, Tongue rolling, attached ear lobes in Humans.
11. & 12. **Homologous organs**: Serial homology in Crustacea – Appendages of Prawn, Forelimbs of vertebrates. **Analogous organs**-Wings of Bird and Butterfly, wings of Bat and Butterfly.
13. & 14. Study of aquatic adaptations – Shark and Turtle.
Study of volant adaptations – Dragon fly, Exocoetus, Draco, Pigeon and Bat.
Study of arboreal adaptations – Chamaeleon. Loris
15. Biostatics problem; Mean, SD, SE, Chi Square test and t- Test (one from each).
16. Revisions

References:

- P. S. Verma and V. K. Agarwal – Genetics, Evolution and Biostatistics (Practical Manual)
- C. B. S. D. Prasad – Practical Zoology: Vertebrate and Genetics
- S. S. Lal – Practical Zoology: Invertebrates and Genetics
- Douglas J. Futuyma and Mark Kirkpatrick – Evolution
- Jerrold H. Zar – Biostatistical Analysis

SCHEME OF PRACTICAL EXAMINATION

Time: 3 Hrs.Max. marks: =40

1. Genetic problem (Monohybrid/ Dihybrid / Interaction of genes)- any one
(Sex linkage/Multiple genes/Multiple alleles)- any one **4x2 =08marks**
2. Identify the spot **A** with suitable reasons (Mutant) **= 03 marks**
3. Identify and comment on the evolutionary significance on the spot **B (Expt. 11 & 12)** **= 04 marks**
4. Mount the sex comb or wing (any one) of the *Drosophila* **= 03 marks**
5. Identify and comment on the adaptations of the spots **C & D** **2x4 = 08 marks**
6. Calculate the allelic frequency based on the given data/Biostatics problem **= 04 marks**
7. Record +Viva **= 07+03 marks**

SCHEME OF VALUATION FOR PRACTICAL VI

1. Genetic problems **08marks each**
2. Identification-1 mark, diagram-1mark, explanation-1mark **=03marks.**
3. Identification-1 mark, diagram-1mark, comment-2mark **=04 marks.**
4. Mounting **= 03 marks**
5. Identification-1 mark, adaptations-3 marks. **2x4=08 marks.**
6. Formula -1 marks, calculation– 2marks, Results-1 **04 marks**
7. Record 07 marks, Viva= 03 marks **10 marks**

COMPULSORY PAPER

SKILL ENHANCEMENT IN ZOOLOGY

Practical Syllabus Credits: 02

4hrs/week x 16 = 64 Hrs.

1. Morphology of honeybee and different castes of honey bee colony.
2. Different species of honey bee (*Apis dorsata*, *Apis florea*, *Apis mellifera*).
3. Mounting of mouth parts of honey bee
4. Adulteration tests to identify pure honey (Filter paper test, Chloride test, Match stick test, Iodine test).
5. Bee hive and various beekeeping equipment's (Hive, Frame, Bee box, Honey extraction unit, Hive cutting knife).
6. Morphology and life cycle of *Bombyx mori*.
7. Identification of Mulberry and Non-mulberry silk cocoons (Mulberry, Muga, Eri, Tassar).
8. Rearing and maintenance of silkworms. Equipment's- Rearing tray, Brush, Ant well, Leaf chopper, Wax sheet, Egg sheet).
9. Diseases and preventive measures of silkworms (Photographs of -Protozoan, Fungal, Bacterial and Viral).
10. Uzi fly as a pest.
11. Morphology of earthworms (e.g. *Eudrelus*, *Eisania*, *Perionyx* species).
12. Types of vermiculture (Bin culture, Pit culture, Pot culture).
13. Basic Concepts of Vermiculture & Vermicomposting: Water holding capacity of Vermicompost.
14. Importance of Vermicompost and Vermiwash.
15. Predators of Vermicompost: Rat, mice, ants, squirrels.
16. Revisions

References

- Applied Zoology by Pradip, V. Jabde.
- Fundamentals of Applied Zoology by Dr. Shaheen Kurshid.
- Applied Zoology by Saras Publications.

V SEMESTER
SKILL ENHANCEMENT IN ZOOLOGY

Time: 3 Hrs.

Max. marks: =40

SCHEME FOR PRACTICAL EXAMINATION

1. Mount and comment the mouthparts of honey bee/ Calculate the water holding capacity of given sample
06 Marks.
2. Identify the spot 'A' and 'B' and comment.
(From practical's 4 & 7).
4 x 2 = 08 Marks
3. Conduct any two tests to identify pure honey.
(From practical 3).
4 x 2 = 08 Marks
4. Identify the spots 'C' and 'D' giving reasons.
(From practical's 6 & 10).
4 x 2 = 08 Marks
5. Practical Record.
10Marks

SCHEME FOR VALUATION

1. Mounting- 04 marks , comment-02 marks/ Procedure 02 marks, Experiment-02 marks and calculation 2 Marks.
 2. Identification -1Mark; Comments – 3 Marks.
 3. Principle and procedure –2 Marks; Result and inference - 2Marks.
 4. Identification with diagram – 2 Marks; Reasons - 2Marks.
 5. Practical Record -10 Marks.
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VI - SEMESTER

PAPER VII Credit=03

ENVIRONMENTAL BIOLOGY, WILDLIFE MANAGEMENT AND CONSERVATION

3hrs/ week X 16= 48 hours

Theory IA= 20 marks

Theory Exam= 80 marks

Total = 100 Marks

UNIT I.- 16Hrs.

Introduction: Environmental Biology- definition.

Ecological spectrum, Definitions of organisms, Environment and Biosphere. Sub-divisions of ecology-Based on Taxonomy and Habitat. Levels of Organization - Autecology and synecology with examples

Ecological factors: Abiotic factors -Light, Temperature, soil and Water.

Biotic factors – Interspecific and Intraspecific relationships: Positive interaction (Symbiosis) - commensalism, proto co-operation and mutualism. Negative interaction (Antagonism) – competition- Gause principle, predation, parasitism and antibiosis.

Limiting factors - Liebig's Law, Shelford's Law and combined concept of limiting factors

Biogeochemical cycles:Definition. Types-Gaseous type (Nitrogen cycle), Sedimentary type (Phosphorous cycle).

Energy - Definition, Types of energy, laws of thermodynamics (I and II Laws)- and their applications. Energy flow with a diagram.

Food chains: Definition, Types of food chains with examples and food webs with example. Ecological pyramids –number, biomass and energy with examples.

UNIT II

Population and community ecology:

-16Hrs

Population ecology – Population attributes, Population density, natality and mortality; age distribution and population growth.

Community ecology – communities, bioindicators

Community structure – ecological determinants, ecological stratification, Ecotone and edge effect with examples.

Ecological succession – General process, sere, seral stages and climax community.

Ecosystems: Definition, Concept of an ecosystem.

Fresh water ecosystem: Physico-chemical nature of fresh water. Lentic and lotic ecosystems. A pond as an ecosystem, Interaction between abiotic and biotic components.

Marine ecosystem - Ecological characters, zonations, fauna and flora. Estuary as an ecotone.

Terrestrial ecosystem - Physico-chemical nature, classification of Biomes - forest, grassland and desert (Environmental conditions, fauna and flora).

Pollution: Definition and types of pollutions. Degradable and non degradable pollutants.

Sources, effects and control of Air, Water, Soil and Noise pollution.

UNIT III

-16 Hrs.

Wildlife Conservation: Importance of wildlife, Ex-situ Conservation- Zoo, captive breeding, botanical garden and gene and sperm bank. In-situ conservation - National parks, Wildlife sanctuaries, biosphere reserve.

Wildlife Protection Act 1972-Project tiger. Project Elephant. Red data book

Values of wildlife, Causes and depletion of wildlife, Conservation strategies, and issues, concept of home range, wildlife corridors and territory.

Animal census- tracing movement remote sensing and GIS.

References:

- P. S. Verma and V. K. Agarwal – Environmental Biology
- S. C. Santra – Environmental Science
- ErachBharucha – Textbook of Environmental Studies
- S. K. Agarwal – Environmental Biology
- Rajesh Gopal – Fundamentals of Wildlife Management
- VidyaSagar – Wildlife Ecology and Management
- Richard B. Primack – Essentials of Conservation Biology
- Michael J. Groom, Gary K. Meffe and C. Ronald Carroll – Principles of Conservation Biology
- George B. Schaller – Wildlife of the World

VI –SEMESTER Credit=02

PAPER VIII- MOLECULAR BIOLOGY AND IMMUNOLOGY

02hrs/ week X 16= 32 hours

Theory Exam= 40 marks; Theory IA= 10 marks

Total = 50 Marks

UNIT I

16 Hrs.

Gene concept: Cistron, Recon and Muton, Test for allelism: Bar locus in *Drosophila*, Jumping genes (transposable elements- Maize) and Properties overlapping gene with example.

Genetic code: deciphering the code, properties of genetic code,.

Protein Synthesis: Transcription in prokaryotes: RNA polymerase, binding, initiation, elongation, termination. Post Transcriptional modification of mRNA-in Eukaryotes, addition of cap and tail, split genes and RNA splicing.

Translation in Prokaryotes: Aminoacylation of tRNA, elongation, termination, Regulation of gene expression- Lac Operon model.

UNIT II

16 Hrs.

Immune system: Introduction, Important organs of immune system-Bone marrow, Thymus, spleen, Lymph nodes, MHC molecules, Antigen, Antibody and its structure. T-Lymphocytes and B-Lymphocytes, their role in immune response. Auto immune diseases-Systemic Lupus Erythematosus, Scleroderma, Rheumatoid arthritis, Multiple sclerosis. AIDS – Structure of HIV, Causes, Symptoms, preventive measures and current status.

References:

- James D. Watson, Tania A. Baker, Stephen P. Bell, Alexander Gann, Michael Levine and Richard Losick – Molecular Biology of the Gene
- Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts and Peter Walter – Molecular Biology of the Cell
- David P. Clark and Nanette J. Pazdernik – Molecular Biology
- Benjamin Lewin – Genes
- T. A. Brown – Gene Cloning and DNA Analysis: An Introduction
- Kuby (Thomas J. Kindt, Richard A. Goldsby and Barbara A. Osborne) – Kuby Immunology
- Ivan Roitt, Jonathan Brostoff and David Male – Immunology
- Abul K. Abbas, Andrew H. Lichtman and Shiv Pillai – Cellular and Molecular Immunology
- Ananthnarayan and Paniker – Textbook of Microbiology
- Satyanarayana U. – Biochemistry

**ENVIRONMENTAL BIOLOGY, WILDLIFE CONSERVATION AND MOLECULAR
BIOLOGY**

16 X 4= 64 Hrs.

Practical Proper =40 Marks; Practical-IA = 10 Marks

Total = 50 Marks

1. Aquarium Ecosystem
2. & 3 - Study of Pond ecosystem
 - (a) Visit to a Pond to study ecological features—One visit.
 - (b) Relationships between components and processes-Biotic and Abiotic factors.
4. Collection of water samples from a sources-(Pond/River/ground water) and Record colour, pH, turbidity, temperature.
5. Estimation of Dissolved Oxygen in two water samples.
6. Estimation of free Carbon dioxide in two water samples.
7. Estimation of hardness of water.
8. Estimation of Chloride content of water.
9. Tracking of wild animals: Wild animal's pugmarks, hoof marks, pellet groups, scats, nest, antlers (Photo identification).
- 11 & 12 Animal associations:**

Symbiosis: Mutualism – Termite &Trichonympha. (keep a Termite &Trichonympha Photo)

Commensalism – Echeneis& Shark.Proto co-operation – Hermit crab & Sea anemone.
13. Antagonism:-Parasitism -Head louse, Bedbug, Tick & mite. Predation- Snake and Frog.
14. Estimation of RNA by Orcinol method.
15. Isolation of DNA.
- 16.National park visit/Zoo/Animal RehabilitationCentre (report Submission/self-study report)

References:

- P. S. Verma and V. K. Agarwal – Practical Zoology
- S. S. Lal – Practical Zoology
- S. C. Santra – Environmental Science: Practical and Field Methods
- Rajesh Gopal – Fundamentals of Wildlife Management
- Keith Wilson and John Walker – Principles and Techniques of Biochemistry and Molecular Biology
- Benjamin Lewin – Genes

SCHEME OF PRACTICAL EXAMINATION

Time: 3 Hrs.

Max. marks: = 40

1. Comment on the interactions between abiotic & biotic components/factors in the Ecosystem setup in the laboratory/ Pond ecosystem -any one. **07 Marks.**
2. Estimate the amount of Dissolved oxygen/free carbon dioxide/Hardness/chloride Write the principle and record your comments. **07 Marks**
3. Isolation of DNA from given material / Estimation of RNA by Orcinol method. **07 Marks**
4. Identify, report on the spots **A & B, emphasising** the type of association. **2x3=06marks**
5. Identify the spot '**C**', comment (Tracking of wild animals) **03 Marks**
6. Record + Viva **7+03=10 Marks**

SCHEME OF VALUATION FOR PRACTICAL VI

1. Ecosystem: Components (structure)-2 mark and processes (Function) -1 mark interactions (comment) -2 marks and diagram -2 marks **07 Marks.**
2. Procedure and principle-2 marks, experiment-2 marks, calculation and results, comments-3 marks **07 Marks**
3. Procedure and principle-2 marks, experiment-2 marks, Tabulation and results/ results, comments-3 marks **07 Marks**
4. Identification – 1 mark, comments – 2 marks **2x3=06 Marks**
5. Identification – 1 mark, comments – 2 marks **03 Marks**
6. Record + Viva **7+03=10Marks**

VI SEMESTER ZOOLOGY
COMPULSORY PAPER Credits: 02
SKILL ENHANCEMENT IN ZOOLOGY

Practical Syllabus

4hrs/week x 16 = 64Hrs.

1. Morphology of honeybee and different castes of honey bee colony.
2. Different species of honey bee (*Apis dorsata*, *Apis florea*, *Apis mellifera*).
3. Mounting of mouth parts of honey bee
4. Adulteration tests to identify pure honey (Filter paper test, Chloride test, Match stick test, Iodine test).
5. Bee hive and various beekeeping equipment's (Hive, Frame, Bee box, Honey extraction unit, Hive cutting knife).
6. Morphology and life cycle of *Bombyx mori*.
7. Identification of Mulberry and Non-mulberry silk cocoons (Mulberry, Muga, Eri, Tassar).
8. Rearing and maintenance of silkworms. Equipment's- Rearing tray, Brush, Ant well, Leaf chopper, Wax sheet, Egg sheet).
9. Diseases and preventive measures of silkworms (Photographs of -Protozoan, Fungal, Bacterial and Viral).
10. Uzi fly as a pest.
11. Morphology of earthworms (e.g. *Eudrilus*, *Eosinia*, *Perionyx* species).
12. Types of vermiculture (Bin culture, Pit culture, Pot culture).
13. Basic Concepts of Vermiculture & Vermicomposting: Water holding capacity of Vermicompost.
14. Importance of Vermicompost and Vermiwash.
15. Predators of Vermicompost: Rat, mice, ants, squirrels.
16. Revisions

References

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- Fundamentals of Applied Zoology by Dr. Shaheen Kurshid.
- Applied Zoology by Saras Publications.

VI SEMESTER
SKILL ENHANCEMENT IN ZOOLOGY

Time: 3 Hrs.

Max. marks: =40

SCHEME FOR PRACTICAL EXAMINATION

1. Mount and comment the mouthparts of honey bee/ Calculate the water holding capacity of given sample 06 Marks.
 2. Identify the spot 'A' and 'B' and comment.
(From practical's 4 & 7). 4 x 2 = 08 Marks
 3. Conduct any two tests to identify pure honey.
(From practical 3). 4 x 2 = 08 Marks
 4. Identify the spots 'C' and 'D' giving reasons.
(From practical's 6 & 10). 4 x 2 = 08 Marks
 5. Practical Record. 10Marks
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SCHEME FOR VALUATION

1. Mounting- 04 marks , comment-02 marks/ Procedure 02 marks, Experiment-02 marks and calculation 2 Marks.
 2. Identification -1Mark; Comments – 3 Marks.
 3. Principle and procedure –2 Marks; Result and inference - 2Marks.
 4. Identification with diagram – 2 Marks; Reasons - 2Marks.
 5. Practical Record -10 Marks.
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Note: Students should study the SEC Practical in either IV/ V/VI Semester.

UNIVERSITY OF MYSORE
Estd. 1916

VishwavidyanilayaKaryasoudha
Crawford Hall, Mysuru- 570 005

No.AC2(S)/35/2025-26

Dated: 07.07.2025

Notification

Sub:- Syllabus and Scheme of Examinations of Zoology (UG) programme
(III & IV Semester) with effect from the Academic year 2025-26.

Ref:- 1. Decision of Board of Studies in Zoology(CB) meeting held on
19-05-2022.

2. Decision of the Faculty of Science & Technology meeting
held on 13-06-2025.

3. Decision of the Academic Council meeting held on 30-06-2025.

The Board of Studies in Zoology (CB) which met on 19-05-2025 has resolved to recommend and approved the III & IV Semester Syllabus and Scheme of Examination of Zoology (UG) programme with effect from the Academic year 2025-26.

The Faculty of Science & Technology and Academic Council at their meetings held on 13-06-2025 and 30-06-2025 respectively has also approved the above said Syllabus and Scheme of Examinations, hence it is hereby notified.

The Syllabus and Scheme of Examinations content may be download from the University Website www.uni-mysore.ac.in.

Registrar
Registrar
University of Mysore
Mysore

To:

1. All the Principals of affiliated Colleges of University of Mysore, Mysore.
2. The Registrar (Evaluation), University of Mysore, Mysuru.
3. The Chairman, BOS/DOS in Zoology, Manasagangothri, Mysore.
4. The Dean, Faculty of Science & Technology, DOS in Botany, MGM.
5. The Director, Directorate of Online Programme, Moulya Bhavan, Manasagangothri, Mysuru.
6. The Director, PMEB, Manasagangothri, Mysore.
7. Director, College Development Council, Manasagangothri, Mysore.
8. The Director, ICD, MGM-Request to publish this Notification in university website.
9. The Deputy Registrar/Assistant Registrar/Superintendent, Administrative Branch and Examination Branch, University of Mysore, Mysuru.
10. The PA to Vice-Chancellor/ Registrar/ Registrar (Evaluation), University of Mysore, Mysuru.
11. Office Copy.

UNIVERSITY OF MYSORE

B.Sc., III SEMESTER

ZOOLOGY SYLLABUS

BIOCHEMISTRY AND PHYSIOLOGY

Theory. Credits: 3: 0: 0

3Hrs./Week x 16Hrs. = 48 Hrs.

Unit I

16 Hours

- **Carbohydrates:** General properties and classification. Biological importance of Monosaccharides (glucose), oligosaccharides (sucrose, maltose and lactose), Polysaccharides (homopolysaccharides-starch and heteropolysaccharides-heparin, glucuronic acid and hyaluronic acid).
- **Proteins:** General Properties of Proteins. Elementary classification of amino acids. Essential and Non-essential amino acids. Levels of organization in proteins (primary, secondary, tertiary and quaternary structure with hemoglobin as example). Biological importance of proteins.
- **Lipids:** Structure and Biological importance of - Saturated and Unsaturated fatty acids, Tri-acylglycerols, Phospholipids, Glycolipids and Steroids. Lipid profile in blood, LDL, VLDL and HDL.
- **Enzymes:** Nomenclature and classification. Properties of enzymes. Mechanism of enzyme action (induced fit theory). Clinical importance of enzymes.
- **Nucleic acids:** Biological importance of Nucleic acids – Structure of DNA (Watson and Crick model). Types of RNA and Clover leaf model of RNA.
- **Vitamins:** Sources, biological role and deficiency diseases of - Fat soluble (A, D, E, K) and Water soluble vitamins (B-complex and Vitamin C).

UNIT II

16 Hours

- **Homeostasis:** Definition and significance of water, glucose and salt balance.
- **Osmoregulation:** Osmoconformers and osmoregulators. Osmoregulation in shark, marine and freshwater teleosts and terrestrial mammals (Kangaroo rat and Camel).
- **Thermoregulation:** Definition of ectotherm, endotherms, poikilotherms, homeotherms and heterotherms. Physiology of temperature compensation in poikilotherms and homeotherms. A note on physiological changes during aestivation and hibernation. Causes of thermal deaths.
- **Digestion:** Hunger, appetite and satiety. Digestion and absorption of carbohydrates, proteins and lipids. Digestive hormones.
- **Respiration:** Physiology of respiration – exchange of gases; Transport of oxygen, oxygen dissociation curve-Bohr's effect. Transport of carbon dioxide – chloride shift, respiratory quotient; Types of respiration-(aerobic and anaerobic)-definition with examples. Cellular respiration: Glycolysis, Krebs's cycle, oxidative phosphorylation, energy budget.

UNIT-III

16 Hrs.

- **Circulation:** Introduction to circulatory system. Structure and functions of human heart, regulation of heart beat, blood pressure, mechanism of blood clotting.
 - **Nitrogen Excretion:** Types of nitrogen excretion- Definition with examples for ammonotelism, ureotelism, uricotelism and gaunotelism- in relation to water economy.
 - Ornithine cycle. Physiology of urine formation in man (Ultra filtration, Tubular reabsorption, Tubular secretion).
 - **Neurophysiology:** Types of neurons. Structure of multipolar neuron and neuro-synapses. Membrane potentials (resting and action), Axonic conduction and synaptic transmission of nerve impulses.
 - **Muscle Physiology:** Types of muscles- Morphological (Striated and non-striated) and functional (voluntary and involuntary muscle). Neuro-muscular junction. Structure and mechanism of contraction and relaxation of skeletal muscle-sliding filament theory. Contractile and regulatory proteins for muscle contraction.
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REFERENCES

- Principles of Biochemistry by Lehninger.
- Animal Physiology by M. P. Arora.
- Chordate Zoology and Animal Physiology by Jordan and Verma.
- Comparative Animal Physiology by William Hoar.
- Biochemistry by Harper.
- Biochemistry by U. Sathyanarayana.
- Book of Physiology by Guyton.

B.SC., III SEMESTER
ZOOLOGY: PRACTICAL – III
BIOCHEMISTRY AND PHYSIOLOGY

Practicals. Credits: 0: 0: 2

4Hrs. /Week x 16 Hrs. = 64 Hrs.

1. Qualitative analysis of Carbohydrates. (Any five tests)
2. Qualitative analysis of Proteins. (Any four tests)
3. Qualitative analysis of Lipids. (Any three tests)
4. Estimation of proteins- Biuret method.
5. Vitamins: Sources & Effects of Fat ('A', 'D', 'E', 'K') and Water soluble vitamins ('B' complex and 'C').
6. Salivary amylase activity on starch
7. Dehydrogenase activity in milk.
8. Detection of nitrogenous excretory wastes: Ammonia, urea and uric acid.
(Ammonia- Nessler's test, Urea- Urease test and Uric acid- Follin's test).
9. Detection of abnormal excretion of glucose, albumin and creatinine.
(Glucose- Benedict's test, albumin- Heller's ring test, Creatinine- Jaffe's test).
10. Blood typing- A, B, AB, O and Rh factors in given human blood samples using antisera.
11. Preparation of haematin crystals.
12. Study of Human Heart beat using Stethoscope-Demonstration.
13. Study of Human Blood Pressure using Sphygmomanometer-Demonstration.
14. Study of Total RBC count-Demonstration.
15. Study of different types of WBC-Demonstration.

B.SC., III SEMESTER
BIOCHEMISTRY and PHYSIOLOGY
SCHEME OF PRACTICAL EXAMINATION

Time: 3 Hrs.

Max. Marks: 40

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|--|-----------|
| 1. Conduct any two tests for the given biomolecule and report. (Pr 1 to 3) | 05 M |
| 2. Any one major physiology experiment (by lots from Pr. 6 to 9). | 08 M |
| 3. Any one minor physiology experiment (by lots from Pr. 10 &11). | 05 M |
| 4. Identify and comment on spots A (Pr. 12 & 13), B & C (Pr. 5). | 04x03=12M |
| 5. Practical Record and Viva. | 10 M |

SCHEME OF VALUATION

1. Principle and procedure-3 M, result and inference- 2 M.
2. Principle and procedure-2 M, experiment - 4 M, comments and importance- 2 M.
3. Principle and procedure-2 M, experiment and importance- 3 M.
4. Identification -1 M, comments/sources and role -3 M.
5. Practical Record – 7M, Viva – 3 M.

B.Sc., III SEMESTER

Elective-1 Histology

Theory-03 credits

03Hrs. /Week x 16Hrs, = 48 Hrs.

Unit –I

16 Hours

Structure of Prokaryotic and Eukaryotic cells.

Histology of different types of cells – Epithelial cell, Muscle cell, Nerve cell, Bone cell, Fat cell, Stem cell.

Histology and types of Epithelial and Connective tissues.

Unit-II

16 Hours

Structure and histoarchitecture of Mammalian Intestine.

Structure and histoarchitecture of Mammalian Liver.

Structure and histoarchitecture of Mammalian Lungs.

Structure and histoarchitecture of Mammalian Kidney.

Histopathology of- Gastric ulcers, Liver cirrhosis, Fibroid lungs, Emphyzema, Kidney stones.

Unit-III

16 Hours

Structure and histoarchitecture of Mammalian Thyroid gland.

Structure and histoarchitecture of Mammalian Adrenal gland.

Structure and histoarchitecture of Mammalian Pancreas.

Structure and histoarchitecture of Mammalian Testis.

Structure and histoarchitecture of Mammalian Ovary.

Histopathology of Goiter, Addison's disease, Cushing's syndrome, PCOD.

REFERENCES

- Histology by H. E. Jordan.
- Basic Histology by J. B. Long.
- Text Book of Histology by L. P. Gartner.

B.SC., III SEMESTER
Elective-2 Endocrinology

Theory-03 credits

03Hrs/Week x 16Hrs=48 Hrs.

Unit –I

16 Hours

Human endocrine system: Concept of autocrine, paracrine, juxtacrine, exocrine and endocrine organs.

Types of hormones. Role of hormones in homeostasis.

Neurohormones – hypothalamic releasing and inhibitory factors and their actions.

Unit-II

16 Hours

Gross morphology and the role of hormones of Pituitary.

Gross morphology and the role of hormones of Thyroid.

Gross morphology and the role of hormones of Parathyroid.

Gross morphology and the role of hormones of Adrenal gland.

Gross morphology and the role of hormones of Pancreas.

Gross morphology and the role of hormones of Pineal gland.

Deficiency diseases of hormones: Dwarfism, Gigantism/Acromegaly, Exophthalmic goitre, Endophthalmic goitre, *Diabetis mellitus*, *Diabetis insipidus*, Addison's disease, Cushing's syndrome.

Unit-III

16 Hours

Hormones of Reproduction: FSH, LH, Estrogen, Progesterone, Testosterone.

Hormonal dynamics in menstrual cycle, pregnancy and parturition.

Environmental estrogens.

Brief account of early onset of puberty vs. Food and lifestyle in both sexes.

REFERENCES

- Text book on Endocrinology by Williams.
- Endocrinology by Harrison.
- Endocrinology by Hadley.
- Test book on Endocrinology by Gayathri Prakash.

B.Sc., IV SEMESTER

ZOOLOGY SYLLABUS

CELL BIOLOGY AND DEVELOPMENTAL BIOLOGY

Theory. Credits: 3: 0: 0

3Hrs. / Week X 16 = 48 hours

UNIT I

16 Hours

The Cell: Ultrastructure of an animal cell.

Membrane system: Plasma membrane: Ultrastructure – fluid mosaic model, functions.

Occurrence, origin, ultrastructure and functions of: Endoplasmic reticulum, Golgi complex and Lysosome (polymorphism).

Mitochondria: Morphology, distribution, ultra structure and significance. Mitochondria as semi- autonomous organelle.

Ribosomes: Occurrence and distribution, structure and chemical composition, dissociation and reconstitution.

Nucleus: Ultrastructure of nucleus, nuclear membrane, nucleoplasm and chromatin fibers.

Nucleolus: Ultrastructure and functions.

Chromosome: Morphology, ultrastructure (nucleosome model)

Giant chromosomes – Polytene and Lampbrush chromosomes-structure.

Chromosomal aberrations – Aneuploidy, deletion, duplication, inversion and translocation.

UNIT II

16 Hours

Cell division: Cell cycle. Mitosis: mitotic stages.

Ultrastructure of centriole. Spindle fibre and its role in chromosome movements. Mitotic inhibitors. Significance of mitosis.

Meiosis: Meiotic stages. Synaptonemal complex, crossing over and chiasma formation, Significance of meiosis.

Parthenogenesis: Natural parthenogenesis – arrhenotoky, thelytoky (amictic and apomictic) and cyclical parthenogenesis with examples. Significance of parthenogenesis.

Gametogenesis: Spermatogenesis – formation of spermatids, spermiogenesis and Oogenesis.

Types of eggs – based on quantity and distribution of yolk with examples. Egg membranes.

Fertilization: Details of the process of fertilization with reference to sea urchin – approach of gametes, role of fertilizin and antifertilizin, activation, penetration, reaction of the egg and amphimixis. Monospermy and polyspermy (physiological and pathological).
Significance of fertilization.

UNIT III

16 Hours

Cleavage: Planes of cleavage – meridional, vertical, equatorial and latitudinal.

Types of cleavage – holoblastic, meroblastic, radial, spiral, discoidal and superficial types with examples.

Development of frog: Structure of frog's egg, Cleavage, blastula, gastrulation and neurulation. Fate maps in blastula.

Amniotes: Development of chick - Structure of hen's egg, cleavage, blastula, gastrulation, formation of primitive streak.

Foetal Membranes: Development, structure and functions of amnion, chorion, yolk sac and allantois.

Placenta: Histological and morphological classification with examples. Placental hormones.

Human Development: Structure of mature spermatozoan, Graafian follicle. Process of ovulation, fertilization, morula, blastocyst, implantation, gastrulation.

REFERENCES

- Comparative embryology by Huetner.
- Cell Biology by C. B. Powar.
- Cell Biology, Genetics, Evolution and Ecology by Jordan and Verma.
- Cell Biology by De Robertis.
- Developmental Biology by Scott, F. Gilbert.
- Chordate Embryology by Verma and Agarwal.
- Developmental Biology-Principles and Concepts by Arora and Grover.

B.Sc., IV SEMESTER
ZOOLOGY: PRACTICAL IV
CELL BIOLOGY AND DEVELOPMENTAL BIOLOGY

Practicals. Credits:0: 0: 2

4 Hrs / Week X 16 = 64 hours

1. Micrometry: Use of ocular and stage micrometers to measure cell and nuclear dimensions.
2. Study of mitotic stages using permanent slides of onion root tip.
3. Squash preparation of onion root tip to study stages of mitosis.
4. Study of meiotic stages using permanent slides of grasshopper testis.
5. Demonstration of squash preparation of grasshopper testis to study stages of meiosis.
6. Study of permanent slide of salivary gland chromosomes of *Drosophila*.
7. Study of permanent slide/ karyotype and ideogram of Human(Male and Female)
8. Preparation of karyotype from the given metaphase plate of *Drosophila* / Grasshopper.
9. Study of different types of eggs – Graafian follicle, frog's egg, hen's egg and insect egg.
10. Study of grasshopper, frog and mammalian sperms.
11. Frog: cleavage stages, blastula (section)
12. Frog: gastrula (yolk plug stage) and neurula (section).
13. Chick embryo: 18 hrs, and 24 hrs (WM and sections).
14. Chick embryo: 36 hrs, and 48 hrs (WM).
15. Study of Developmental stages in *Drosophila* – egg, larva, pupa and adult.

B.Sc., IV Semester

CELL BIOLOGY AND DEVELOPMENTAL BIOLOGY SCHEME OF PRACTICAL EXAMINATION

Time: 3 Hrs.

Max. Marks: 40M

1. Make a temporary squash preparation of the given material and demonstrate a stage of cell division. Write the procedure and comment on the stage with a diagram. 08 M
2. Prepare the karyotype of the given metaphase plate (*Drosophila* / grasshopper)
(or)
Measure the cell / nuclear diameter of the given material in the slide and report. 04 M
3. Identify with reasons the slides/spots **A & B** (Pr. 4, 6 & 15) 03x02=06 M
4. Identify and comment on the slide/spot **C, D & E** (Pr. 09 to 14) 04x03=12 M
5. Practical Record and Viva. 10 M

SCHEME OF VALUATION

1. Procedure & preparation -5M, report with diagram -3 M.
 2. Alignment - 3 M, definition & significance -1 M.
(or)
Calibration – 2 M, calculation & report -2 M.
 3. Identification – 1 M, diagram with reason – 2 M.
 4. Identification – 1M, diagram with comments - 3 M.
 5. Practical Record – 07 M, Viva – 03 M
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B.Sc., IV Semester
Elective – Applied Zoology

Theory-03 credits

03 Hrs, /Week x16 Hrs, = 48 Hrs.

Unit-I

16 hours

Sericulture: Introduction, scope and importance of Sericulture.

Morphology and life cycle of *Bombyx mori*.

Diseases and preventive measures of silkworm diseases (Protozoan, Fungal, Bacterial and Viral).

Rearing of mulberry silkworm up to cocoon stage. Non-mulberry silkworm cocoons.

Equipment's used in sericulture. Grainage and its importance.

Sericulture as a cottage industry.

Unit-II

16 Hours

Vermiculture: Introduction, scope and importance of vermiculture.

Morphology and reproduction of earthworm.

Different species of earthworms used in vermiculture-Exotic and Indigenous species.

Farming and management of vermiculture.

Composition of vermicompost. Differences between vermiculture and vermicomposting.

Composition of vermicompost. Predators of vermicompost.

Benefits and importance of vermicompost and vermiwash.

Vermiculture as a cottage industry.

Unit-III

16 Hours

Apiculture: Introduction, scope and importance of apiculture.

Morphology of honey bees and Social organization of bee colony. Important species of honey bees.

Artificial Bee rearing (Apiary) – Beekeeping equipment's.

Selection of Bee species for Apiculture. Bee foraging.

Bee diseases and enemies. Control and preventive measures.

Products of Apiculture industry and its uses (honey, bee wax, propolis), pollen, etc.

Bee keeping as a cottage industry. Role of honeybees in pollination.

REFERENCES

1. Applied Zoology by Pradip, V. Jabde.
2. Fundamentals of Applied Zoology by Dr. Shaheen Kurshid.
3. Applied Zoology by Saras Publications.

B.Sc., IV SEMESTER
ZOOLOGY
COMPULSORY PAPER
Skill Enhancement in Zoology

Practical syllabus 02 credits

04hrs./Week x 16Hrs. = 64 Hrs.

Apiculture

1. Morphology of honeybee and different castes of honey bee colony.
2. Different species of honey bee (*Apis dorsata*, *Apis florea*, *Apis mellifera*).
3. Adultration tests to identify pure honey (Filter paper test, Chloride test, Match stick test, Iodine test).
4. Bee hive and various beekeeping equipment's (Hive, Frame, Bee box, Honey extraction unit, Hive cutting knife).

Sericulture

5. Morphology and life cycle of *Bombyx mori*.
6. Identification of Mulberry and Non-mulberry silk cocoons (Mulberry, Muga, Eri, Tassar).
7. Rearing and maintenance of silkworms. Equipment's- Rearing tray, Brush, Ant well, Leaf chopper, Wax sheet, Egg sheet).
8. Diseases and preventive measures of silkworms (Photographs of -Protozoan, Fungal, Bacterial and Viral).
9. Uzi fly as a pest.

Vermiculture

10. Morphology of earthworms (*Eudrelus*, *Eosinia*, *Perionyx* species).
11. Types of vermiculture (Bin culture, Pit culture, Pot culture).
12. Basic Concepts of Vermiculture & Vermicomposting: Water holding capacity of vermicompost.
13. Importance of vermicompost and vermiwash.
14. Predators of vermicompost: Rat, mice, ants, squirrels.
