

B.Sc. ZOOLOGY SYLLABUS UNDER CBCS

B.Sc. II Year
III - SEMESTER
Core Paper – III

Animal Diversity- Vertebrates and Developmental Biology

Periods: 60

Max. Marks: 80

UNIT – I

(15 Periods)

1.1. Urochordata, Cephalochordata, Cyclostomata

- 1.1.1. Salient features of Urochordata
- 1.1.2. Retrogressive metamorphosis and its significance in Urochordata
- 1.1.3. Salient features and affinities of Cephalochordata
- 1.1.4. General characters of Cyclostomata
- 1.1.5. Comparison of the Petromyzon and Myxine
- 1.1.6. General characters and classification of Chordata upto orders with examples.

1.2. Pisces

- 1.2.1. General characters of Fishes
- 1.2.2. Classification of fishes up to order level with examples
- 1.2.3. Scoliodon – Respiratory, Circulatory and Nervous system.
- 1.2.4. Types of Scales and types of Fins

UNIT – II

(15 Periods)

2.1. Amphibia

- 2.1.1. General characters of Amphibians
- 2.1.2. Classification of Amphibians up to orders with examples.
- 2.1.3. Rana tigrina - Respiratory, Circulatory and Nervous system.
- 2.1.4. Parental care in amphibian; neoteny and paedogenesis.

2.2 Reptilia

- 2.2.1. General characters of Reptilia
- 2.2.2. Classification of Reptilia up to orders with examples
- 2.2.3. Calotes – Respiratory system, Circulatory and Nervous system.
- 2.2.4. Temporal fosse in reptiles and its evolutionary importance
- 2.2.5. Distinguished characters of Poisonous and Non poisonous snakes.
- 2.2.6. Rhynchocephalia.

UNIT – III

(15 Periods)

3.1. Aves

- 3.1.1. General characters of Aves
- 3.1.2. Classification of Aves up to orders with examples.
- 3.1.3. Columba livia -, Digestive system, Circulatory systems, Respiratory system and Nervous system.
- 3.1.4. Migration in Birds
- 3.1.5. Flight adaptation in Birds

3.2. Mammalia

- 3.2.1. General characters of Mammalia
- 3.2.2. Classification of Mammalia up to orders with examples
- 3.2.3. Rabbit –Digestive, Respiratory, Circulatory and Nervous system.
- 3.2.4. Dentition in mammals.
- 3.2.5. Aquatic adaptations in Mammals.

UNIT – IV

(15 Periods)

4.1 Developmental Biology and Embryology

- 4.1.1 Gametogenesis (Spermatogenesis and Oogenesis)
- 4.1.2 Fertilization
- 4.1.3 Types of eggs
- 4.1.4 Types of cleavages
- 4.1.5 Development of Frog up to formation of primary germ layers
- 4.1.6 Formation of Foetal membrane in chick embryo and their functions
- 4.1.7 Types and functions of Placenta in mammals
- 4.1.8 Regeneration in Turbellaria and Lizards

Suggested Readings:

1. E.L.Jordan and P.S. Verma 'Chordate Zoology' -. S. Chand Publications.
2. Mohan P.Arora. 'Chordata – I, Himalaya Publishing House Pvt.Ltd.
3. Marshal, Parker and Haswell 'Text book of Vertebrates'. ELBS and McMillan, England.
4. Alfred Sherwood Romer. Thomas S. Pearson 'The Vertebrate Body, Sixth edition, CBS college Publishing, Saunders College Publishing
5. George C. Kent, Robert K. Carr. Comparative Anatomy of the Vertebrates, 9th ed. McGraw Hill.
6. Kenneth Kardong Vertebrates: Comparative Anatomy, Function and Evolution, 4th ed, 'McGraw Hill.
7. J.W. Young, The Life of Vertebrates, 3rd ed, Oxford University press.
8. Harvey Pough F, Christine M. Janis, B. Heiser, Vertebrate Life, Pearson, 6th ed, Pearson Education Inc.2002.

B.Sc. ZOOLOGY SYLLABUS UNDER CBCS

B.Sc. II Year

ZOOLOGY PRACTICAL SYLLABUS FOR III SEMESTER

ZOOLOGY - CORE PAPER - III

Animal Diversity- Vertebrates and Developmental Biology

Periods: 30

Max. Marks: 25

Study of museum slides / specimens / models (Classification of animals up to orders)

1. Protochordata: Amphioxus, Amphioxus T.S. through pharynx
2. Cyclostomata: Petromyzon, Myxine, Ammocoetus larva
3. Pisces: Sphyrna Pristis, Torpedo, Channa, Pleuronectes, Hippocampus, Exocoetus, Echieneis, Labeo, Catla, Clarius, Auguilla, Protopterus, Scales: Placoid, Cycloid, Ctenoid
4. Amphibia: Ichthyophis, Amblystoma, Siren, Hyla, Rachophous, Bufo, Rana, Axolotal larva
5. Reptilia : Draco, Chamaeleon, Gecko, Uromastix, Vipera russelli, Naja, Bungarus, Enhydrina, Typhlops, Testudo, Trionyx, Crocodilus, Ptyas.
6. Aves: Archaeopteryx, Passer, Psittacula, Bubo, Alcedo, Columba, Corvus, Pavo; Collection and study of different types of feathers: Quill, Contour, Filoplume, Down
7. Mammalia: Ornithorhynchus, Tachyglossus, Pteropus, Funambulus, Manis, Loris, Hedgehog

Histology: T.S. of Liver, Pancreas, Kidney, Stomach, Intestine, Lungs Artery, Vein, Bone T.S., Spinal cord.

Osteology :

1. Rabbit – Axial skeleton system (bones of Skull and Vertebral Column)
2. Varanus, Pigeon and Rabbit – Appendicular skeleton system (bones of limbs and girdles)

Dissections of Labeo/Tilapia:

1. Digestive system.
2. Brain, Weberian ossicles
3. V, VII, IX, X cranial nerves

Embryology

1. Study of T.S. of Testis and Ovary of a mammal
2. Study of different stages of cleavages (2, 4, 8, 16 cell stages); Morula, Blastula
3. Study of chick embryos of 18 hours, 24 hours, 33 hours and 48 hours of incubation

Laboratory Record work shall be submitted at the time of practical examination

An "Animal album" containing photographs, cut outs, with appropriate write up about the above mentioned taxa. Different taxa/ topics may be given to different sets of students for this purpose.

Computer aided virtual dissections.

Suggested manuals

1. S.S.Lal, Practical Zoology – Vertebrata
2. P.S.Verma, A manual of Practical Zoology – Chordata
3. Freeman & Bracegirdle, An atlas of embryology

B.Sc. ZOOLOGY SYLLABUS UNDER CBCS

B.Sc. II Year
ZOOLOGY PRACTICAL SYLLABUS FOR III SEMESTER
ZOOLOGY - CORE PAPER - III

Animal Diversity- Vertebrates and Developmental Biology

Time: 2 Hrs.

Max. Marks: 25

1. Identification, labeled diagram and salient features of spots: (6 Museum specimens + 2 slides)	08
2. Osteology (02 Spots)	04
3. Dissection (one) (Diagram + Dissection & Display)	05
4. Embryology (02 Spots)	04
5. Certified practical record	03
6. Animal Album	02
7. Viva voce	02

B.Sc. ZOOLOGY SYLLABUS UNDER CBCS

B.Sc. II Year
IV - SEMESTER
Core Paper – IV

Cell Biology, Genetics & Evolution

Periods: 60

Max. Marks: 80

UNIT – I

(15 Periods)

1. Cell Biology

1.1. Cell theory, Differences of Prokaryotic and Eukaryotic cells

1.2. Ultrastructure of animal cell

1.3. Structure and functions of plasma membrane proteins.

1.4. Structure and functions of cell organelles –

Endoplasmic reticulum, Golgi body, Ribosomes, Lysosomes, centrosomes, Mitochondria and Nucleus

1.1.5 Chromosomes – Structure, types, giant chromosomes

1.1.6 Cell Division - Mitosis, Meiosis.

1.1.7. Cell cycle and its regulation.

UNIT – II

(15 Periods)

2. Molecular Biology

2.1 DNA (Deoxyribo Nucleic Acid) - Structure

2.2 RNA (Ribo Nucleic Acid) - Structure, types

2.3 DNA Replication

2.4 Protein Synthesis – Transcription and Translation

2.5 Gene Expression – Genetic Code; operon concept

2.6 Molecular Biology Techniques- Polymerase Chain Reaction, Electrophoresis

UNIT – III

(15 Periods)

3. Genetics

3.1 Mendals laws of Inheritance and Non-Medelian Inheritance

3.2 Linkage and Crossing over

3.3. Sex determination and sex-linked inheritance

3.4 Chromosomal Mutations- Deletion, Duplication, Inversion, Translocation, Aneuploidy and Polyploidy.

3.5. Gene mutations- Induced versus Spontaneous mutations.

3.6. Inborn errors of metabolism.

3.7. One gene one enzyme, one gene one polypeptide theory.

UNIT – IV

(15 Periods)

4. Evolution

4.1. Theories of evolution – Lamarckism and Neo-Lamarckism, Darwinism and Neo-Darwinism, Modern synthetic theory.

4.2. Evidences of Evolution and Hardy Weinberg Law.

4.3. Forces of Evolution – mutation, gene flow, genetic drift, and natural selection.

4.4. Isolation – Pre-mating and post mating isolating mechanisms

4.5. Speciation: Methods of speciation - Allopatric and sympatric

4.6. Causes and Role of Extinction in Evolution.

Suggested readings

1. Lodish, Berk, Zipursky, Matsudaria, Baltimore, Darnell 'Molecular Cell Biology' W.H. Free man and company New York..
2. Gardner, E.J., Simmons, M.J., Snustad, D.P. (2008). Principles of Genetics. VIII Edition. Wiley India.
3. Snustad, D.P., Simmons, M.J. (2009). Principles of Genetics. V Edition. John Wiley and Sons Inc.
4. Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics. X Edition. Benjamin Cummings.
5. Russell, P. J. (2009). Genetics- A Molecular Approach. III Edition. Benjamin Cummings.
6. Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B. Introduction to Genetic Analysis. IX Edition. W. H. Freeman and Co.
7. Ridley, M. (2004). Evolution. III Edition. Blackwell Publishing
8. Barton, N. H., Briggs, D. E. G., Eisen, J. A., Goldstein, D. B. and Patel, N. H. (2007). Evolution. Cold Spring, Harbour Laboratory Press.
9. Hall, B. K. and Hallgrimsson, B. (2008). Evolution. IV Edition. Jones and Bartlett Publishers
10. Campbell, N. A. and Reece J. B. (2011). Biology. IX Edition, Pearson, Benjamin, Cummings.
11. Douglas, J. Futuyma (1997). Evolutionary Biology. Sinauer Associates.
12. Minkoff, E. (1983). Evolutionary Biology. Addison-Wesley.
13. James D. Watson, Nancy H. Hopkins 'Molecular Biology of the Gene'
14. Jan M. Savage. Evolution, 2nd ed, Oxford and IBH Publishing Co., New Delhi.
15. Gupta P.K., 'Genetics'

B.Sc. ZOOLOGY SYLLABUS UNDER CBCS

B.Sc. II Year
ZOOLOGY PRACTICAL SYLLABUS FOR III SEMESTER
ZOOLOGY Core Paper – IV
Cell Biology, Genetics and Evolution

Periods: 30

Max. Marks: 25

I. Cytology

1. Preparation and Identification of slides of Mitotic divisions with onion root tips
2. Preparation and Identification of different stages of Meiosis in Grasshopper Testes
3. Identification and study of the following slides
 - i). Different stages of Mitosis and Meiosis
 - ii) Lamp brush and Polytene chromosomes

II. Genetics

1. Problems on Genetics - Mendelian inheritance, Linkage and crossing over, Sex linked inheritance

III. Evolution

1. Museum Study of Fossil animals: Peripatus, Coelacanth Fish, Dipnoi fishes, Sphenodon, Archeopteryx.
2. Study of homology and analogy from suitable specimens and pictures
3. Problems on Hardy-Weinberg Law
4. Macroevolution using Darwin finches (pictures)

Laboratory Record work shall be submitted at the time of practical examination

An "Album" containing photographs, cut outs, with appropriate write-up about Genetics and Evolution.

Computer aided techniques should be adopted as per UGC guide lines.

Suggested manuals

Manual of laboratory experiments in cell biology Edward, G.

B.Sc. ZOOLOGY SYLLABUS UNDER CBCS

B.Sc. II Year
B.Sc. PRACTICAL MODEL PAPER FOR IV SEMESTER
ZOOLOGY - CORE PAPER - IV
Cell Biology, Genetics and Evolution

Time:2 Hrs.

Max. Marks: 25

- | | |
|---|----|
| 1. Identification, labeled diagram and salient features of spots:
(05 spots) | 10 |
| 2. Prepare and Identify Mitotic divisions with onion root tips: | 04 |
| 3. One Problem from Genetics | 03 |
| 4. One Problem from Evolution | 03 |
| 5. Certified practical record | 03 |
| 6. Album | 02 |
| 7. Viva voce | 02 |

B.Sc. II year Zoology Syllabus

Semester – III

Paper – Sericulture

Skill Enhancement Course

Objectives:

To train and impart knowledge of Mulberry and silkworm, their culture practices, maintenance and management practices. Entrepreneur motivation for practicing sericulture as small scale cottage industry.

Unit: I

(15 Hrs)

- 1.1. History and economic importance of sericulture – types of silkworm – Mulberry and non-Mulberry (Tassar, Eri and Muga).
- 1.2. Systematic position of Bombyx and Life Cycle - Morphology of silk gland.
- 1.3. Horticulture – mulberry cultivation – Environmental conditions for mulberry cultivation – soil, climatic factors, preparation of land.
- 1.4. Intercultivation – pruning methods – harvesting
- 1.5. Diseases and pests of mulberry and control methods.

Unit: II

(15 Hrs)

- 2.1. Silkworm rearing – general principles of silkworm rearing – primary requisite for successful rearing.
- 2.2. Feeding of silkworm, bed cleaning, sparing, moulting, late age silkworms – Moulting and harvesting economics of silkworm.
- 2.3. Diseases and pests of silkworm.
- 2.4. Reeling –reeling appliances and process of reeling cocoons.
- 2.5. Sericulture as cottage industry.

References:

1. Handbook of sericulture – S.R. Ullal and M. N. Varasimhanna
2. An introduction to sericulture – G. Ganga, J. Sulochana Chetty
3. Manual of Sericulture – FA O Volumes.

B.Sc. II year Zoology Syllabus
Semester – IV
Paper – Vermiculture and Vermicomposting

Skill Enhancement Course

Objectives:

To create awareness among the students on vermi compost practices

Unit: I (15 Hrs)

- 1.1 Scope of vermi technology- Vermiculture and vermi composting – difference between vermiculture and vermi composting –
- 1.2 Earthworm diversity – Ecological groups of earthworms, biology of composting earthworms – *Eoisena foetida*, *Eudrilus lugeniae*.
- 1.3 Soil – Physical, chemical and biological features
- 1.4 Organic waste sources – problems in traditional composting, vermi composting
- 1.5 Types small and large scale pit method, heap method.

Unit: II (15 Hrs)

- 2.1. Vermiculture techniques – vermi culture process – site selection - Selection and collection of species mono and poly culture
- 2.2. Essential parameters for vermi culture – bedding. Methods of harvesting worms general manual methods, self harvesting method, mechanical method
- 2.3. Nutritive value of vermi compost, storing and packing of compost
- 2.4. Applications of vermi composting in agricultural and horticultural practices
- 2.5. Economic of vermi culture, nationalized bank, NABARD support for vermi culture.

References:

1. Earthworm ecology by LEE
2. Biology of earthworm by Steven son
3. Vermicomposting tech – soil health to human health by Ranganathan L.S.

B.Sc. II year Zoology Syllabus
Semester – IV

Skill Enhancement Course

Model Question Paper

Max. Marks 40

Section – A (Short Answer type)(4x4 =16 Marks)

Answer all questions

- 1.
- 2.
- 3.
- 4.

Section – B (Essay Answer type) (2x12 =24 Marks)

5.a.

Or

b.

6.a.

Or

b.