



JYOTI NIVAS COLLEGE AUTONOMOUS BANGALORE – 560 095
DEPARTMENT OF ZOOLOGY
B.Sc. V SEMESTER ZOOLOGY PAPER V SYLLABUS (2021 NEP BATCH)
DIVERSITY OF NON-CHORDATES AND ECONOMIC ZOOLOGY

COURSE TITLE	DIVERSITY OF NON-CHORDATES AND ECONOMIC ZOOLOGY
COURSE CODE	21VZL5 (T)
COURSE CREDITS	04
TOTAL CONTACT HOURS	60 Hours
DURATION OF ESE	2 ½ Hours
CONTINUOUS INTERNAL ASSESSMENT (CIA)	40 Marks
END SEMESTER EXAMINATION (ESE)	60 Marks

Course Objectives:

- Learn different Phyla based on the general characters with examples
- Understand the basic concepts in levels of organization
- Learn the systems in certain organisms.
- Describe Vermiculture and Vermitechnology
- Know the life cycles of economically important non-chordates.

Course Outcomes (COs):

The student at the completion of the course will be able to:

- 1) Acquire in-depth knowledge on the structural and functional diversity of non - chordates.
- 2) Identify the organisms and classify them based on characters.
- 3) Explain evolutionary relationship amongst non-chordate groups
- 4) Comprehend the knowledge of life cycle of parasites of all groups
- 5) Apply the knowledge of Economic Zoology to employment in different applied sectors or become entrepreneurs.

CO Mapping with Knowledge Levels

CO No.	Course outcomes statement	Knowledge level
1	Acquire in depth knowledge on the structural and functional diversity of non -chordates.	K1. K2, K3, K4
2	Identify the organisms and classify them based on characters	K1. K2, K3, K4 K6

3	Explain evolutionary relationship amongst non-chordate groups	K1, K2, K3, K4, K5, K6
4	Comprehend the knowledge of life cycle of parasites of all groups	K1, K2, K3, K4, K5, K6
5	Apply the knowledge of Economic Zoology to employment in different applied sectors or become entrepreneurs.	K1, K2, K3, K4, K5, K6

Knowledge Levels- K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of Course Outcomes (COs) with Program Outcomes (Pos)

	CO1	CO2	CO3	CO4	CO5
PO1	✓	✓	✓	✓	✓
PO2	✓	✓	✓	✓	✓
PO3				✓	✓
PO4				✓	✓
PO5					✓
PO6				✓	✓
PO7	✓	✓	✓	✓	✓
PO8	✓	✓		✓	✓
PO9	✓	✓		✓	✓
PO10	✓	✓	✓	✓	✓

Programme Objectives aligned with Graduate attributes

PO1- Knowledge, PO2- Scientific thinking, PO3- Entrepreneurial skills
 PO4- Analytical skills, PO5- Communication skills, PO6- Social commitment PO7-
 Research and Inquiry, PO8- Conservation of Environment
 PO9- Employability, PO10- Academic orientation

Unit 1: Patterns of Organization**7 Hrs.**

- Levels of organization: Unicellular, Multicellular, Tissue, Organs and Organ systems
- Organisation and types of germ layers- Diploblastic (apparent and absolute) and Triploblastic
- Development- Direct and Indirect; Protostomes and Deuterostomes
- Coelom- Acoelom, Pseudocoelom and Eucoelom (Enterocoelom and Schizocoelom)
- Metamerism – Pseudometamerism, Eumetamerism- Homonomous and Heteronomous
- Symmetry-Asymmetry, Radial, Biradial and Bilateral
- Systematics and taxonomy: Introduction to ICZN- Binomial Nomenclature

Unit 2. Phylum Protozoa and Porifera**7 Hrs.**

- Phylum Protozoa: General characters and classification up to classes with examples
- Reproduction: Asexual – Binary fission and multiple fission in *Amoeba*; Sexual – Autogamy in *Paramecium aurelia* and conjugation in *Paramecium caudatum*
- General characters of the Phylum Porifera and classification upto classes with suitable examples
- Canal system and its evolution: Asconoid, Syconoid, Leuconoid and Rhagonoid with examples.

Unit 3. Coelenterata and Ctenophora**8 Hrs.**

- **a.** General characters of the Phylum Coelenterata and classification up to classes with suitable examples
- Externals, Life cycle and metagenesis in *Obelia*
- Polymorphism in Siphonophora with reference to *Halistemma*
- **b.** Salient features of Ctenophora (*Pleurobranchia*)
Affinities

Unit 4. Platyhelminthes and Nematoda**7 Hrs.**

- General characters of the Phylum Platyhelminthes and classification up to classes with suitable examples
- Morphology and reproduction of *Fasciola hepatica*
- General characters of the Phylum Nematoda and classification up to classes with suitable examples
- Morphology and reproduction in *Ancylostoma duodenale*

Unit 5. Annelida and Arthropoda**9 Hrs.**

- General characters of the phylum Annelida and classification upto classes with suitable examples
- *Hirudinaria granulosa* (Leech) (Morphology and Parasitic adaptations)
- General characters of the Phylum Arthropoda and classification up to classes with suitable examples
- Arthropoda-*Palaemon* (Prawn) (Morphology, Appendages, and Reproduction)

Unit 6. Mollusca, Echinodermata and Hemichordata**10 Hrs.**

- General characters of the phylum Mollusca and classification upto classes with suitable examples
- Unio- Morphology, Ultra structure of Shell, Digestion and Reproduction
- General characters of the phylum Echinodermata and classification upto classes with suitable examples
- *Asterias* (Star fish)- Morphology and Water Vascular System
- Hemichordata: Study of *Balanoglossus* (Habit and Habitat, Morphology, Modification of the coelom in the three regions and Tornaria Larva)

Unit 7. Economic Zoology I**6 Hrs.**

- Economic importance of Protozoa: useful and harmful protozoa
- Economic importance of Porifera: Beneficial (as food, commensals & others) and harmful Poriferans, Spongiculture
- Economic importance of Coelenterata: Significance of corals and coral reefs
- Economic importance of Annelida: Vermitechnology and Vermicomposting

Unit 8. Economic Zoology II**6 Hrs.**

- Economic importance of Arthropoda: Life cycle and control of the different pests: Gundhi bug, Sugarcane leafhopper, Rhinoceros beetle
- Termites and their control
- Sericulture (Different types of Silk, Life cycle of *Bombyx mori*), Apiculture (Types of honey bees and beekeeping)
- Mollusca: Pearl culture in India and chank fisheries

References

1. Ruppert, Edward E., Fox, Richard S., and Robert D. Barnes. 2003. *Invertebrate zoology: A functional evolutionary approach*, 7th ed. Saunders College Publishing, Philadelphia.
2. Hunter: Life of Invertebrates (1979, Collier Macmillan)
3. Marshall: Parker & Haswell Textbook of Zoology, Vol. I (7th ed 1972, Macmillan)
4. Moore: An Introduction to the Invertebrates (2001, Cambridge University Press)
5. Brusca and Brusca (2016) Invertebrates. Sinauer publisher
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7. Neilsen (2012). Animal Evolution: Interrelationships amongst living Phyla. Oxford
8. Larry S Roberts, John Janovy (2004). Gerard D. Schmidt and Larry S Roberts' Foundations of Parasitology. McGraw Hill.
9. Bisht. D.S., Apiculture, ICAR Publication.
10. Singh S., Beekeeping in India, Indian council of Agricultural Research, New Delhi.
11. Pedigo, L.P. (2002). Entomology and Pest Management, Prentice Hall.
12. C A Edwards and J R Lofty (1972), Biology of Earthworms
13. Destructive and Useful Insects by C. L. Metcalf (1992) McGraw Hill
14. Sericulture for Rural Development: Hanumappa (1978), Himalaya Publication
15. Sericulture in India Sarkar, D.C. (1988), CSB, Bangalore
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17. A Manual of Zoology by Ekambaranath Ayyar and Anantha Krishnan (2019)
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29. Jordan E.L. and Verma P.S. 1963. (Reprint 2002) Invertebrate Zoology, S Chand & company, New Delhi.

ZOOLOGY PRACTICAL PAPER–V

COURSE TITLE	DIVERSITY OF NON-CHORDATES AND ECONOMIC ZOOLOGY
COURSE CODE	215ZL5 (P)
COURSE CREDITS	02
TOTAL CONTACT HOURS	4 hours/week
DURATION OF ESE	03 hours
CONTINUOUS INTERNAL ASSESSMENT (CIA)	25 Marks
END SEMESTER EXAMINATION (ESE)	25 Marks

Experiments

1. **PROTOZOA:** Slides - Euglena, Noctiluca, Vorticella, Paramecium
2. **PORIFERA:** Specimens -Sycon, Hyalonema, Spongilla and Gemmule, Euplectella
3. **COELENTERATA:** Slides –Obelia(W. M) and its medusa(W. M). Specimens - Aurelia, Sea anemone, Gorgonia, Astraea, Fungia
4. **HELMINTHES:** Specimens - Liver fluke, Tapeworm and Ascaris (male and female)
Slides - T.S of Ascaris (male and female)
5. **ANNELIDA:** Specimens - Nereis, Heteronereis, Arenicola
6. **ARTHROPODA:** Specimens - Peripatus, Centipede, Millipede, Limulus, Praying mantis
7. **MOLLUSCA:** Specimens- Chiton, Aplysia, Sepia and Oyster, Cuttle bone
8. **ECHINODERMATA:** Specimens -Sea star, Brittle star, Sea urchin, Sea cucumber and Sea lily
9. **HEMICHORDATA:** **Balanoglossus**, TS. of Balanoglossus through proboscis
10. **A. Mounting of Prawn Appendages**
11. **B. Study of dissected systems** **LEECH:** Digestive System, Nervous system, Male and female reproductive system
Cockroach Mouth parts and Nervous System
Fresh water mussel: Nervous system

References

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