**ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM**

**B.Sc Zoology Syllabus (w.e.f: 2020-21 A.Y)**

**B. Sc Semester: I Credits:4**

**Paper: 1 Animal Diversity – Biology of Nonchordates Hrs/Wk:4**

**Course Outcomes**: By the completion of the course the graduate should able to –

 • Describe general taxonomic rules on animal classification

• Classify Protozoa to Coelenterate with taxonomic keys

• Classify Phylum Platyhelminthes to Annelida phylum using examples from parasitic adaptation and vermin composting

• Describe Phylum Arthropoda to Mollusca using examples and importance of insects and Molluscans • Describe Echinodermata to Hemichordate with suitable examples and larval stages in relation to the phylogeny

**Learning objectives:**

• To understand the taxonomic position of protozoa to Helminthes.

• To understand the general characteristics of animals belonging to protozoa to hemichordate.

• To understand the structural organization of animal’s phylum from protozoa to hemichordate.

 • To understand the origin and evolutionary relationship of different phyla from protozoa to hemichordate.

• To understand the origin and evolutionary relationship of different phylum from annelids to hemichordates.

UNIT I: Principles of Taxonomy – Binomial nomenclature – Rules of nomenclature Whittaker’s five kingdom concept and classification of Animal Kingdom. Phylum Protozoa: General Characters and classification of protozoa up to species level with suitable examples Locomotion, nutrition and reproduction in Protozoan’s Lepidium (type study)

UNIT II: Phylum Porifera: General characters and classification up to species level with suitable examples Skelton in Sponges Canal system in sponges Phylum Coelenterate: General characters and classification up to species level with suitable examples Mutagenesis in Obelia, Polymorphism in coelenterates, Corals and coral reefs formation Phylum Ctenophore: General Characters and Evolutionary significance (affinities)

UNIT III: Phylum Platy Helminthes: General characters and classification up to species level with suitable examples Life cycle and pathogen city of Fasciola hepatica Parasitic Adaptations in Helminthes Phylum Nemathelminthes: General characters and classification up to species level with suitable examples Life cycle and pathogen city of Ascaris lumbricoides

UNIT IV: Phylum Annelida: General characters and classification up to species level with suitable examples Hirudinaria granulosa- External characters, digestive system, excretory system and reproductive system, Evolution of Coelom and Coelomoducts, Vermiculture - Scope, significance, earthworm species, processing, Vermicompost, economic importance of vermin compost

Phylum Arthropoda :General characters and classification up to species level with suitable examples PrawnExternal characters, appendages, respiratory system and circulatory system Vision and respiration in Arthropoda, Metamorphosis in Insects Peripatus- Structure and affinities Social Life in Bees and Termites

 UNIT V: Phylum Mollusca: General characters and classification up to species level with suitable examples ,Pearl formation in Pelecypod, Sense organs in Mollusca, Torsion in gastropods

Phylum Echinodermata: General characters and classification up to species level with suitable examples, Water vascular system in starfish, Larval forms of Echinodermata

Phylum Hemichordate: General characters and classification up to species level with suitable examples, Balanoglossus - Structure and affinities

**Co-curricular activities (suggested)**

• Preparation of chart/model of phylogenic tree of life, 5-kingdom classification, Elphidium life cycle etc.

• Visit to Zoology museum or Coral island as part of Zoological tour

• Charts on life cycle of Obelia, polymorphism, sponge spicules

• Clay models of canal system in sponges

• Preparation of charts on life cycles of Fasciola and Ascaris

• Visit to adopted village and conducting awareness campaign on diseases, to people as part of Social Responsibility.

• Plaster-of-Paris or Thermocol model of Periapt’s

• Construction of a vermicompost in each college, manufacture of manure by students and donating to local farmers

• Models of compound eye, bee hive and terminarium (termitaria) by students

• Visit to apiculture centre and short-term training as part of apprenticeship programme of the govt. of Andhra Pradesh

 • Chart on pearl forming layers using clay or Thermocol

• Visit to a pearl culture rearing industry/institute

• Live model of water vascular system

• Phylogeny chart on echinoderm larvae and their evolutionary significance

 • Preparation of charts depicting the feeding mechanism, 3coeloms, tornaria larva etc., of Balanoglossus.

REFERENCE BOOKS:

1. L.H. Hyman ‘The Invertebrates’ Vol I, II and V. – M.C. Graw Hill Company Ltd.

 2. Kotpal, R.L. 1988 - 1992 Protozoa, Porifera, Coelenterata, Helminthes, Arthropoda, Mollusca, Echinodermata. Rastogi Publications, Meerut.

3. E.L. Jordan and P.S. Verma ‘Invertebrate Zoology’ S. Chand and Company.

4. R.D. Barnes ‘Invertebrate Zoology’ by: W.B. Saunders CO.,1986.

 5. Barrington. E.J.W., ‘Invertebrate structure and Function’ by ELBS.

6. P.S. Dhami and J.K. Dhami. Invertebrate Zoology. S. Chand and Co. New Delhi.

7. Parker, T.J. and Haswell‘A text book of Zoology’ by, W.A., Mac Millan Co.London.

 8. Barnes, R.D. (1982). Invertebrate Zoology, VEdition

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**Semester: I**

**Animal Diversity – Biology of Nonchordates Lab**

**Learning Outcomes**:

• To understand the importance of preservation of museum specimens

• To identify animals based on special identifying characters

• To understand different organ systems through demo or virtual dissections

• To maintain a neat, labelled record of identified museum specimens

**Syllabus:**

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

**Protozoa**: Amoeba, Paramecium, Paramecium Binary fission and Conjugation, Vorticella, Entamoeba histolytica, Plasmodium vivax

**Porifera:** Sycon, Spongilla, Euspongia, Sycon- T.S & L.S, Spicules, Gem mule

**Coelenterata:** Obelia – Colony & Medusa, Aurelia, Physalia, Velella, Corallium, Gorgonia, Pennatula.

**Platyhelminthes**: Planaria, Fasciola hepatica, Fasciola larval forms – Miracidium, Redia, Cercaria, Echinococcus granulosus, Taenia solium, Schistosoma haematobium.

**Nemathelminthes:** Ascaris (Male & Female), Drancunculus, Ancylostoma ,Wuchereria Annelida: Nereis, Aphrodite, Chaetopteurs, Hirudinaria, Trochophore larva

 **Arthropoda:** Cancer, Palaemon, Scorpion, Scolopendra, Sacculina, Limulus, Periapt’s, Larvae - Nauplius, Mysis, Zoea, Mouth parts of male &female Anopheles and Culex, Mouthparts of Housefly and Butterfly. xiii.

**Mollusca**: Chiton, Pila, Unio, Pteredo, Murex, Sepia, Loligo, Octopus, Nautilus, Glochidium larva **Echinodermata:** Asterias, Ophiothrix, Echinus, Clypeaster, Cucumaria, Ante don, Bipinnaria larva **Hemichordata**: Balanoglossus, Tornaria larva.

**2. Dissections:**

 **Prawn:** Appendages, Digestive system, Nervous system, Mounting of Statocyst

**Insect** Mouth Parts

**Laboratory Record work shall be submitted at the time of practical amination**

 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 techniques should be adopted or show virtual dissections**

**RFERENCE MANUALS**:

 1. Practical Zoology- Invertebrates S.S.Lal

2. Practical Zoology - Invertebrates P.S.Verma

3. Practical Zoology - Invertebrates K.P.Kurl

4. Ruppert and Barnes (2006) Invertebrate Zoology,8th Edition, Holt Saunders International Edition