

BOTANY

Semester III

Archegoniatae

Core V

Course Objectives

- To know the principles, hypotheses and process of adaptation of plants to land habitat.
- To learn about the origin classification, and characteristics of bryophytes through some representative genera.
- To learn about the origin and distribution of vascular plants and stages of evolution of conducting tissues.
- To study the morphology, and characteristics of pteridophytes through some representative genera.
- To learn the characteristics, classification and importance of the gymnosperms.
- To have a general knowledge on the fossils and fossilization processes.

Course Outcomes:

- Able to understand the mechanism of the evolution of the higher plants and their adaptation to land habit.
- Knowledge on the diversity of archegoniates and their and their pattern of habitat specific distribution.
- Knowledge on the characteristics of bryophytes and skill to differentiate the genera on the basis of their morphology and anatomy.
- Ability to identify the members of pteridophytes and knowledge on their characteristic features.
- Understand the unique features and distribution of gymnosperms.
- Capacity to analyze various types of fossils on the basis of their characters.

Unit-I:

Learning Outcomes: The students will gain knowledge on the basic characteristics of Archegoniates.

- Introduction: Unifying features of archegoniates; Transition to land habit; Alternation of generations. General characteristics; Origin of land plants and Adaptations to land habit;
- Bryophytes: Origin and Classification; Range of thallus organization. Classification (up to family). Structure, Reproduction and evolutionary trends in *Riccia*, *Marchantia*, *Anthoceros* and *Funaria* (developmental stages not included). Ecological and economic importance of bryophytes.

Unit-II:

Learning Outcomes: The learners shall acquire an understanding on the origin, evolution and structural uniqueness of pteridophytes.

Pteridophytes: General characteristics, classification. Classification (up to family), morphology, anatomy and reproduction of *Psilotum*, *Selaginella*, *Equisetum*, *Pteris* and *Marsilea*. Apogamy, and apospory, heterospory and seed habit, telome theory, stellar evolution and economic importance.

Unit-III:

Learning Outcomes: The learners shall have the skill to identify and evaluate the importance of gymnosperms in a habitat

Gymnosperms: General characteristics, classification (up to family), morphology, anatomy and reproduction of *Cycas*, *Pinus*, *Ginkgo* and *Gnetum*. (Developmental details not to be included). Ecological and economic importance.

Unit-IV:

Learning Outcomes: The student will have knowledge to identify and analyze a fossil specimen.

Palaeobotany: Geological time scale, fossils and fossilization process. Morphology, anatomy and affinities of *Rhynia*, *Calamites*, *Lepidodendron*, *Lyginopteris*, *Cycadeoidea* and *Williamsonia*.

Practical:

1. Morphology, anatomy and reproductive structures of *Riccia*, *Marchantia*, *Anthoceros*, *Funaria*.
2. *Psilotum*- Study of specimen, transverse section of synangium (permanent slide).
3. *Selaginella*- Morphology, whole mount of leaf with ligule, transverse section of stem, whole mount of strobilus, whole mount of microsporophyll and megasporophyll (temporary slides), longitudinal section of strobilus (permanent slide).
4. *Equisetum*- Morphology, transverse section of internode, longitudinal section of strobilus, transverse section of strobilus, whole mount of sporangiophore, whole mount of spores (wet and dry) (temporary slide), transverse section of rhizome (permanent slide).
5. Study of temporary preparations and permanent slides of *Marsilea*.
6. *Pteris*- Morphology, transverse section of rachis, vertical section of sporophyll, whole mount of sporangium, whole mount of spores (temporary slides), transverse section of rhizome, whole mount of prothallus with sex organs and young sporophyte (permanent slide).
7. *Cycas*- Morphology (coralloid roots, bulbil, leaf), whole mount of microsporophyll and megaspore, T.S root, leaflet, rachis
8. *Pinus*- Morphology (long and dwarf shoots, whole mount of dwarf shoot, male and female cones), T.S. Needle, stem, L.S. male cone, whole mount of microsporophyll, whole mount of Microspores (temporary slides), L.S. of female cone.

9. *Gnetum*- Morphology (stem, male & female cones), transverse section of stem, vertical section of ovule (permanent slide).
10. Study of some fossil slides / photographs as per theory.

Text Books:

- ✓ *Vasistha, B. R. (2017) Botany for Degree student, Bryophyta, S. Chand Publication, New Delhi.*
- ✓ *Singh, V., Pandey, P.C. and Jain, D.K. (2017). Archegoniate, Rastogi Publication, Meerut.*
- ✓ *Pandey B.P (2020) Botany For Degree Students NEP S Chand Publication New Delhi.*

Reference Books:

- ✓ *Acharya, B. S. (2017), Archegoniate, Kalyani Publishers, New Delhi.*
- ✓ *Vashistha, P.C., Sinha, A.K., Kumar, A. (2010). Pteridophyta. S. Chand. New Delhi, India.*
- ✓ *Bhatnagar, S.P. & Moitra, A. (1996). Gymnosperms. New Age International (P) Ltd Publishers, New Delhi, India.*
- ✓ *Raven, P.H., Johnson, G.B., Losos, J.B., Singer, S.R. (2005). Biology. Tata McGraw Hill, Delhi.*
- ✓ *Rashid. A. An Introduction To Archegoniate Plants (Vikas Publication) New Delhi.*