

Department of Botany, Govt. Degree College Baramulla (Autonomous)

(NAAC Re-accredited Grade A and CPE status)

Syllabus 7th Semester (4 years Honours Degree Course)

Subject: Botany

Title: Diversity of Cryptogams and Gymnosperms (Credits: 4 theory + 2 practical)

Paper Code: BOTC3722M

No. of Contact hours: 64T+64P=128

Course Learning Objectives (CLOs)

By the end of the course, students will be able to:

1. Explain the diversity, habitats, structure, classification, general characteristics, cell organisation and reproduction of major groups of algae with representative examples.
2. Analyze the diversity, classification, morphology as well as reproductive features of bryophytes as the amphibians of the plant kingdom and appreciate their economic importance.
3. Interpret and explain diversity, classification, reproduction, and evolutionary significance of pteridophytes with emphasis on, origin of seed habit, apospory and apogamy in pteridophytes.
4. Evaluate the diversity, morphology, reproduction, and evolution of gymnosperms besides understanding basic concepts in Paleobotany.

Unit I: Algae

Introduction, distribution and habitat; Algal cell structure, Photosynthetic pigments, modes of reproduction; Classification of algae (Lee, 1999); Importance of algae; symbiotic relationship of algae (coral reefs).

General characters, and reproduction of: Cyanophyta (*Anabaena*); Rhodophyta (*Polysiphonia*) Chlorophyta, (*Chlorella*) Heterokontophyta: Bacillariophyceae (*Bacillaria*) Phaeophyceae (*Sargassum*), Xanthophyceae (*Botrydium*).

Unit II: Bryophytes

Bryophytes as amphibians of Plant Kingdom; General characters, life cycles and alternation of generations of bryophytes; Classification of bryophytes (Goffinet and Buck, 2009); Economic importance of bryophytes.

Morphology, anatomy, reproduction and life cycles of Hepaticopsida (*Riccia*); Anthocerotopsida (*Anthoceros*) and Bryopsida (*Polytrichum*).

Unit-III: Pteridophytes

General characters of pteridophytes; Diversity and distribution; classification (A. R. Smith (2006), Life cycle and alternation of generations; polyembryony; economic importance.

Morphology, reproduction and life cycle of Psilotales (*Psilotum*), Lycopodiales (*Lycopodium*), Polypodiales (*Adiantum*), and Selaginellales (*Selaginella*).

Heterospory and Origin of Seed habit; Origin of Land plants; Apospory and apogamy in pteridophytes; Eusporangiatae and Leptosporangiatae (Brief account);

Unit-IV- Gymnosperms and Paleobotany

Introduction and General Characteristics, Distribution of gymnosperms, Classification (Sporne, 1965), Evolutionary trends and origin of gymnosperms; Economic importance of gymnosperms.

General characters, morphology and reproduction of Cycadales (*Cycas*), Ginkgoales (*Ginkgo*), Coniferales (*Cedrus*), Ephedrales (*Ephedra*), Cupressales (*Taxus*), and Gnetales (*Gnetum*).

Paleobotany: Geological time scale; Fossils and their types, formation and preservation of fossils; Fossil pteridophyta (*Rhynia*); Fossil gymnosperms (*Williamsonia*).

Practical:

1. Collection of algae from various habitats or localities, identification and preparation of temporary mounts.
2. Study of morphology and reproductive structures of following algal specimens.
Anabaena, Chlorella, Polysiphonia, Bacillaria, Sargassum, and Botrydium.
3. Study of morphological and reproductive structures of *Riccia, Anthoceros* and *Polytrichum* from available specimens.
4. Study of morphology, anatomy and reproductive structures of *Psilotum, Lycopodium, Adiantum, and Selaginella* from available specimens.
5. Study of male and female cones of *Cycas, Cedrus, Ephedra* and *Taxus*
6. Study of anatomy of stem of *Cedrus, Ginkgo, and Ephedra.*
7. Study of anatomy of leaves (needles) of *Cedrus* and *Taxus*
8. Study of morphological features of *Rhynia* and *Williamsonia* with the help of charts.

Suggested Readings:

1. Morris, I.M.1986. An Introduction to algae. Cambridge University Press, U.K.
2. Vashista B.R & A.K Sinha, 2005. Botany for degree students – Algae, Fungi, Bryophyta, Pteridophyta, Gymnosperms. S. Chand Publication, New Delhi.
3. Chapman, V.J and Chapman D.J .1973. The Algae. Macmillan, London.
4. Bold, H.C and Wynne, M.J. 1985. Introduction to the Algae: structure and reproduction. Prentice Hall, USA.
5. Pandey S.N. *et al*, 2015 A Text-book of Botany Volume I, 12th edition. Vikas Publications, New Delhi, India.
6. Pandey, S.N. *et al*, 2016 A Textbook Of Botany: Volume - II, 13th edition Vikas Publications, New Delhi, India.
7. Biswas, C and Johri, B.M. 2009. The Gymnosperms. Narosa Publishing House, New Delhi.
8. Sporne, K.R. 1965. The morphology of Gymnosperms, Hutchinson University library, London, UK.

9. Vashishta, P.C., Sinha, A. K and Kumar, A. 2006. Gymnosperms. S. Chand Publication, New Delhi, India.
10. Vashishta, P.C. 2006. Pteridophytes. S. Chand Publications, New Delhi, India.
11. Rashid, A. 1998. An introduction to Bryophyta. Vikas Publishing House Pvt. Ltd, New Delhi, India.