SEMESTER III

Core course 3 Code: BO3CRT03

PHYCOLOGY AND BRYOLOGY

(Theory 54 hrs; Practical 36 hrs; Credits 3 + 1)

Objectives:

- To study the evolutionary importance of Algae as progenitors of land plants
- Understand the unique and general features Algae and Bryophytes and familiarize it
- To study the external morphology, internal structure and reproduction of different types of Algae and Bryophytes
- Realize the application of Phycology in different fields

PHYCOLOGY (Theory 36 hrs; Practical 27 hrs)

Module 1: Introduction to Phycology and classification of Algae (9 hrs)

Introduction: general characters, habitat diversity, range of thallus structure and pigments in algae; structure of algal flagella. Different types of life cycle and alternation of generations in algae. Classification: by Fritsch (1945); brief introduction to the modern classification by Lee (2009) [up to divisions].

Module 2: Type study (18 hrs)

Salient features, thallus structure and reproduction of algae in the following groups with special reference to the type(s) mentioned: Cyanophyceae - *Nostoc*; Chlorophyceae - *Volvox, Oedogonium, Cladophora, Chara;* Xanthophyceae – *Vaucheria;* Bacillariophyceae - *Pinnularia*; Phaeophyceae – *Ectocarpus, Sargassum*; Rhodophyceae - *Polysiphonia*.

Module 3: Artificial culture and economic importance of Algae (9 hrs)

Algal culture: isolation, cultivation and preservation of micro- and macro-algae. Economic importance of algae: algae as food, SCP, fodder, green manure, role in N_2 fixation, medicine and biofuels. Commercial products from Algae - carrageenin, agar-agar, alginates and diatomaceous earth. Role of algae in pollution studies: as indicators of pollution and as bioremediation agents. Eutrophication – algal bloom; harmful and toxic algal blooms – neurotoxins and parasitic algae.

PRACTICAL (27 hrs)

1. Conduct a field visit to any one of the ecosystems rich in Algae to experience algal diversity. Submit a report with photographs.
2. Make micropreparations of vegetative and reproductive structures of the types mentioned in the syllabus.
3. Algal Culture: isolation and cultivation of micro- and macro-algae in suitable growth media (Demonstration only).
4. Familiarizing the technique of algal collection preservation.

BRYOLOGY (Theory 18 hrs; Practical 9 hrs)

Module 4: General introduction and classification of bryophytes (4 hrs)

Introduction, general characters and classification of bryophytes by Rothmaler (1951); a very brief account of systems and classifications by Goffinet *et al* (2008).

Module 5: Type study (12 hrs)

Distribution, morphology, anatomy, reproduction and life cycle of the following types (developmental details are not required): Hepaticopsida - *Riccia, Marchantia*; Anthocerotopsida - *Anthoceros*; Bryopsida - *Funaria*. Evolution of gametophyte and sporophyte among Bryophytes.

Module 6: Economic importance (2 hrs)

Economic importance of Bryophytes – biological, ecological, medicinal and as potting material.

PRACTICAL (9 hrs)

1. Study the habit, anatomy of thallus and reproductive structures of *Riccia, Marchantia, Anthoceros,* and *Funaria*.

REFERENCES

1. Anand N, 1989. Culturing and cultivation of BGA. Handbook of Blue Green Algae.
2. Fritsch F E, 1935. The structure and reproduction of the algae, Vol. 1 and II. Uni. Press. Cambridge.
3. Morris I, 1967. An Introduction to the Algae. Hutchinson and Co. London.
4. Robert Edward Lee, 2008. Phycology. Cambridge University Press,
5. Singh V, Pandey P C, Jain D K. A text book of botany.
6. Vashishta B R. Text Book of Algae. New Delhi.
7. Gangulee Das and Dutta. College Botany Vol. I. Central Book Depot. Calcutta.
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9. Khan M, 1983. Fundamentals of Phycology. Bishen Singh Mahendra Pal Singh, Dehradun.
10. Campbell H D, 1940. The Evolution of land plants (Embryophyta). Univ. Press, Stanford.
11. Chopra R N, P K Kumar, 1988. Biology of Bryophytes. Wiley Eastern Ltd. New Delhi.
12. Parihar N S, 1965. An Introduction to Bryophyta. Central Book Depot, Allhabad.
13. Shaw J A, Goffinet B, 2000. Bryophyte Biology. Cambridge UniversityPress.
14. Smith G M, 1938. Crytogramic Botany Vol. II. Bryophytes and pteridophytes. McGraw Hill Book Company, London.
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