

B.Sc. 1 Year

Semester – I

BBO-C101  
DSC-1 Biodiversity (Microbes, Algae, Fungi and Archegoniate)

MM : 100  
Time : 3 hrs

Sessional : 30  
ESE : 70  
Pass Marks : 40

Learning objective:

- Introduction to Vedic Botany and Vedic period plants mentioned Vedas and their medicinal properties, uses and plants used in Yajna and environmental purification.
- To acquire knowledge of different microorganism like Virus, Bacteria, Algae, Fungi and Archegoniate.
- To become familiar with general characteristic Biodiversity components.

Learning outcomes:

At the end of course student will be able

- The student will be able to understand Vedic culture and Indian Traditional Knowledge (ITK).
- The student will be able to structural and functional components of Biodiversity conservation.
- The student will be able identify key points for ecosystem and ecological importance of various components of Biodiversity and ecological issues and environmental conservation.
- The student will be able take the decisions for carrier point of views in research, industries, academia and Biodiversity conservation.

Unit 1: Vedic Plants and Microbes

(10 Lectures)

Introduction to Veda and Agnihotra, Concept of botany in Vedas; naming of plant in Rigveda, classification of Vedic plants, medicinal properties in plants; plants used in Yajna and environmental purification; Vedic plants used to control the microbial diseases and for the well fare of human beings; Agnihotra as Vedic technology- use of plants; Virus and bacteria- introduction, reproduction and their economic importance.

Unit 2: Algae

(12 Lectures)

General characteristics, ecology, economic importance, and distribution, range of thallus organization, reproduction, and classification of algae, morphology and life-cycles of the following: *Nostoc*, *Chlamydomonas*, *Oedogonium*, *Vaucheria*, *Fucus*, *Polysiphonia*.

Unit 3: Fungi

(12 Lectures)

General characteristics, ecology, range of thallus organization, cell wall composition, nutrition, reproduction and classification, life cycle of *Rhizopus*, *Penicillium*, *Alternaria*, *Puccinia*, *Agaricus*; Symbiotic associations-lichens General account, reproduction and significance of Mycorrhiza: Ectomycorrhiza and Endo-mycorrhiza and their significance.

Unit 4: Bryophytes and Pteridophytes

(18 Lectures)

General characteristics, adaptations to land habit, classification, range of thallus organization of Bryophytes; Classification (up to family), morphology, anatomy and reproduction of *Riccia*, *Marchantia*, and *Funaria*; Ecology and economic importance of Bryophytes; Pteridophytes: General characteristics, classification, early land plants (*Rhynia*), classification(up to family), morphology, anatomy and reproduction of *Selaginella*, *Equisetum* and *Pteris*; (Developmental details not to be included); heterospory and seed habit, ecological and economic importance of Pteridophytes.

Unit 5: Gymnosperms

(6 Lectures)

General characteristics, classification. (up to family), morphology, anatomy and reproduction of *Cycas* and *Pinus*, (developmental details not to be included), ecological and economical importance.

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DSC-I SEMESTER I BBO-C151(LAB COURSE-CC-01)

1. EMs/Models of viruses – T-Phage and TMV, Line drawing/Photograph of Lytic and Lysogenic Cycle.
2. Types of Bacteria from temporary/permanent slides/photographs; EM bacterium; Binary Fission; Conjugation; Structure of root nodule.
3. Gram staining
4. Study of vegetative and reproductive structures of *Nostoc*, *Chlamydomonas* (electron micrographs), *Oedogonium*, *Vaucheria*, *Fucus\** and *Polysiphonia* through temporary preparations and permanent slides. (\* *Fucus* - Specimen and permanent slides)
5. *Rhizopus* and *Penicillium*: Asexual stage from temporary mounts and sexual structures through permanent slides.
6. *Alternaria*: Specimens/photographs and tease mounts.
7. *Puccinia*: Herbarium specimens of Black Stem Rust of Wheat and infected Barberry leaves; section/tease mounts of spores on Wheat and permanent slides of both the hosts.
8. *Agaricus*: Specimens of button stage and full grown mushroom; Sectioning of gills of *Agaricus*.
9. Lichens: Study of growth forms of lichens (crustose, foliose and fruticose)
10. Mycorrhiza: ectomycorrhiza and endomycorrhiza (Photographs)
11. *Marchantia*- morphology of thallus, w.m. rhizoids and scales, v.s. thallus through gemma cup, w.m. gemmae (all temporary slides), v.s. antheridiophore, archegoniophore, l.s. sporophyte (all permanent slides).
12. *Funaria*- morphology, w.m. leaf, rhizoids, operculum, peristome, annulus, spores (temporary slides); permanent slides showing antheridial and archegonial heads, l.s. capsule and protonema.
13. *Selaginella*- morphology, w.m. leaf with ligule, t.s. stem, w.m. strobilus, w.m. microsporophyll and megasporophyll (temporary slides), l.s. strobilus (permanent slide).
14. *Equisetum*- morphology, t.s. internode, l.s. strobilus, t.s. strobilus, w.m. sporangiophore, w.m. spores (wet and dry)(temporary slides); t.s. rhizome (permanent slide).
15. *Pteris*- morphology, t.s. rachis, v.s. sporophyll, w.m. sporangium, w.m. spores (temporary slides), t.s. rhizome, w.m. prothallus with sex organs and young sporophyte (permanent slide).
16. *Cycas*- morphology (coralloid roots, bulbil, leaf), t.s. coralloid root, t.s. rachis, v.s. leaflet, v.s. microsporophyll, w.m. spores (temporary slides), l.s. ovule, t.s. root (permanent slide).
17. *Pinus*- morphology (long and dwarf shoots, w.m. dwarf shoot, male and female), w.m. dwarfshoot, t.s. needle, t.s. stem, l.s./t.s. male cone, w.m. microsporophyll, w.m. microspores (temporary slides), l.s. female cone, t.l.s. & r.l.s. stem (permanent slide).

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**Suggested readings:**

1. Dubey, R.C. 2021. *Vedic microbiology- A Scientific Approach* (English Version), Motilal Banarasidas International, Delhi- 110007.
2. Dubey, R.C. A Text Book of Biotechnology. S. Chand & Company Pvt. Ltd. Ram Nagar, New Delhi-110 055.
3. Dubey, R.C. and Maheshwari, D.K. S. Chand & Company Pvt. Ltd. Ram Nagar, New Delhi-110 055
3. Kumar H.D. 1999. Introductory phycology. Affiliated East West Press, New Delhi.
4. Matthews, R.E. 2013 Fundamentals of Plant Virology ELSEVIER India.
5. Sethi I.K and Walia S.K. 2011. Text book of fungi and their allies. Mc Millian Publishers, New Delhi
6. Vashishta, B.R., Sinha A.K. 2012 Botany for degree students: Fungi. S. Chand New Delhi.
7. Vashishta, B.R., Sinha A.K. and Singh, V.P 2012 Botany for degree students: Algae, S.Chand New Delhi.
8. Pelczar, M.J. (2001) Microbiology, 5th edition, Tata Mc Graw-Hill Co, New Delhi.
9. Prescott, L. Harley, J. and Klein, D. (2005) Microbiology, 6th edition, Tata Mc Graw- Hill Co. New Delhi.
10. Fritsch F.E. (1935 The Structure & Reproduction of Algae 1945): Cambridge University Press Cambridge, U.K. Vol. I, Vol. II.
11. Smith, G.M (1955) :Cryptogamic Botany(Vol. I Algae, Fungi, & Lichens) McGraw-Hill Book Co., New York .
12. Kumar, H.D. 1999. Introductory Phycology. Aff. East-west Press Pvt ltd., Delhi.

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