B.Sc. I Year **Semester – I**

BBO-C101

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

MM : 100 Sessional : 30
Time : 3 hrs ESE : 70
L Credit Pass Marks : 40
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Total hours: 60

Learning objective:

- To understand the Vedic period plants mentioned in Rigveda and Atharvaveda and their medicinal properties uses and plants used in Yajna.
- To acquire knowledge of different microorganisms like Virus, Bacteria, Algae, Fungi and Archegoniate.
- To acquire an overall knowledge on the morphology, classification and reproduction of Virus, Bacteria, Algae, Fungi and Archegoniate.
- To become familiar with general characteristics and biodiversity components.

Learning outcomes:

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

Unit 1: Vedic Plants and Microbes **(10 Lectures)**

Introduction to Veda, naming of plants in Veda, Vedic classification of plants, medicinal plants in Rigveda and Atharvaveda and their medicinal properties and uses. Plants used in Yajna. Viruses– discovery, general structure, replication (general account), DNA virus (T-phage); lytic and lysogenic cycle, RNA virus (TMV); Economic importance; Bacteria – discovery, General characteristics and cell structure; Reproduction – vegetative, asexual and recombination (conjugation, transformation and transduction); economic importance.

Unit 2: Algae **(12 Lectures)**

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

Unit 3: Fungi **(12 Lectures)**

General characteristics, ecology, cell wall composition, nutrition, reproduction and life cycle of *Rhizopus*, , *Puccinia, Agaricus*; Symbiotic associations- lichens general account, reproduction and significance, 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.

Unit 5: Gymnosperms **(8 Lectures)**

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

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DSC-1 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 gemmacup, 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 (temporaryslides), 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. dwarf shoot, 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)

Suggested readings:

1. Dubey, R.C. Vedic Microbiology. Publisher: Motilal Banarsidass, New Delhi.
2. Kumar H.D. 1999. Introductory Phycology. Affiliated East West Press, New Delhi.
3. Matthews, R.E. 2013 Fundamentals of Plant Virology ELSEVIER India.
4. Sethi I.K and Walia S.K. 2011. Text book of fungi and their allies. Mc Millian Publishers, New Delhi.
5. Vashishta, B.R., Sinha A.K. 2012 Botany for degree students: Fungi. S.Chand New Delhi.
6. Vashishta, B.R., Sinha A.K. and Singh, V.P 2012 Botany for degree students: Algae, S.Chand New Delhi.
7. Pelczar, M.J. (2001) Microbiology, 5th edition, Tata Mc Graw-Hill Co, New Delhi.
8. Desikachari, T. V. 1959. Cyanophyta, ICAR, New Delhi.
9. Pandey B.P. 2001. College Botany Volume 1, S Chand & Company Pvt.Ltd, New Delhi.
10. Pandey. B.P. 2014 Modern Practical Botany, (Vol-I) S. Chand and Company Pvt. Ltd., New Delhi.
11. Smith. G. M. 1996. Cryptogamic Botany Volume I, Tata Mc Graw Hill, New Delhi.
12. Plant Taxonomy. Singh, Pandey and Jain. Publisher: Rastogi Publications, Merrut. ISBN: 9789350781708, 9789350781708.
13. Taxonomy of Angiosperms. by V. Singh , D. K. Jain. Rastogi Publication, Meerut.

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