

**2<sup>nd</sup> SEMESTER**  
**CORE COURSE BOTANY - PAPER II**

**BOT216C: BOTANY: PLANT ECOLOGY AND TAXONOMY**

**(CREDITS: THEORY - 4, PRACTICAL -2)**

**THEORY = 60 HOURS**

**Unit 1: Ecology, ecological factors and plant communities (14 lectures)**

Introduction to Ecology; Soil: Origin, Formation and Composition, Soil Profile; water - states of water in the environment, precipitation types; light and temperature as ecological factors; adaptation of hydrophytes and xerophytes.

Plant communities - characteristics; ecotone and edge effect; succession - processes and types.

**Unit 2: Ecosystem and phytogeography (16 Lectures)**

Structure; energy flow; trophic organization; food chains and food webs; ecological pyramids, primary productivity; biogeochemical cycling of carbon, nitrogen and Phosphorous.

Phytogeography - biogeographical zones of India, concept of endemism.

**Unit 3: Plant Taxonomy and classification (16 Lectures)**

Introduction to plant taxonomy; types of classification - artificial, natural and evolutionary; classification systems - Bentham and Hooker (up to series), Angiosperm Phylogeny Group (AGP) (up to order level).

Numerical taxonomy - OTUs, character weighing and coding, cluster analysis; phonograms and cladograms (definitions and differences).

Roles of herbarium and botanical garden, important herbaria and botanical gardens of the world and India;

**Unit 4: Identification and nomenclature (14 Lectures)**

Flora, identification Keys: single-access and multi-access; taxonomic evidences from cytology, phytochemistry and molecular data; taxonomic hierarchy - ranks, categories and taxonomic groups;

Botanical nomenclature - principles of ICN; binominal system of nomenclature, typification, author citation, valid publication, principle of priority.

**PRACTICAL= 60 HOURS**

- i.** To determine minimum number of quadrats required for reliable estimate of density in a grassland.
- ii.** To study frequency and importance value index of species in a grassland.
- iii.** To estimate bulk density and porosity of grassland and forest soils.
- iv.** To determine moisture content and water holding capacity of grassland and forest soil,
- v.** Determination of pH, and analysis of two soil samples for carbonates, chlorides, nitrates, sulphates, organic matter and base deficiency by rapid field test.

- vi. To estimate transparency, pH and temperature of different water bodies.
- vii. Preparation of identification keys from the available specimens.
- viii. Taxonomic description of the following families: Malvaceae (*Malva/Althea*); Fabaceae (*Trifolium/Lathyrus*); Rosaceae (*Rosa/Potentilla*), Asteraceae (*Helianthus/Taraxacum*), Solanaceae (*Solanum/Datura*), Apiaceae (*Daucus/Scandix*), Lamiaceae (*Mentha/Nepeta/Salvia*) and Liliaceae (*Hemerocallis/Tulipa*); Poaceae (*Avena/Poa*).
- ix. xiv. Mounting of a properly dried and pressed specimen of any wild plant with herbarium label (to be submitted in the record book).

### **SUGGESTED READING**

- Chapman, J.L. and Reiss, M.J. 1997. Ecology: principles and Applications. Cambridge University Press, London.
- Colinvaux, P. 1993. Ecology. John Wiley, New York.
- Dash, M.C. 1993. Fundamental of Ecology. 1993. Tata McGraw Hill Publishing Company, Ltd.
- Judd, S., Walter et al. 2008. Plant Systematics: A Phylogenetic Approach. Sinauer Associates, Inc. Sunderland, USA.
- Molies, M.C. Jr. 1999. Ecology: Concepts and Applications. WCB/McGraw-Hill Company, London.
- Odum, E.P. and Barrett, G.W. 2004. Fundamentals of Ecology. Brooks, Cole.
- Pooja, S. N. 2010. Economic Botany. Discovery Publishing House, New Delhi.
- Simpson, Michael G. 2006. Plant Systematics. Elsevier, California, USA.
- Singh, Gurcharan 2012. Plant Systematics: Theory and Practice. Oxford and IBH Publishers, New Delhi
- Singh, V., Pande, P. C. and Jain, D.K. 2010. Diversity and Systematics of Seed Plants. Rastogi Publications, Meerut, India.
- Stiling, P. 2001. Ecology: Theories and Applications. Printice-Hall Inc.
- Wikens, G. E 2004. Economic Botany- Principles and Practices. Kluwer Publishers, Netherlands.
- Sharma, P.D. (2010) Ecology and Environment. Rastogi Publications, Meerut, India. 8<sup>th</sup> edition.
- Singh, G. (2012). *Plant Systematics: Theory and Practice*. Oxford & IBH Pvt. Ltd., New Delhi. 3<sup>rd</sup> edition.
- J.S. Singh, S. R. Gupta & S P Singh. Ecology, Environmental Science and Conservation. S. Chand Publishing Company