CLUSTER UNIVERSITY OF SRINAGAR

Semester - II

Core Course: Botany Paper II
Plant Ecology and Taxonomy
(Credits: Theory-4, Practicals-2)

THEORY

Unit 1: Ecology, ecological factors and plant communities **(16 Lectures)**

Introduction to ecology, ecological factors: soil - origin, formation, composition, soil profile. Water: states of water in the environment, precipitation types. Light and temperature: Variation as ecological factors; Morphological adaptation of hydrophytes and xerophytes.
Plant communities - characteristics; ecotone and edge effect; succession; processes and types.

Unit 2: Ecosystem and Phytogeography **(14 Lectures)**

Structure; energy flow; trophic organisation; Food chains and food webs, Ecological pyramids production and productivity; Biogeochemical cycling; Cycling of Carbon, Nitrogen and Phosphorous
Phytogeography - Principle Biogeographical zones; concept of Endemism

Unit 3: Plant Taxonomy and Classification **(14 Lectures)**

Introduction to plant taxonomy; types of classification, artificial, natural and phyllogenetic;
Classificatory systems - Bentham and Hooker (upto series), Angiosperm Phylogeny Group (2016, upto order level)
Numerical taxonomy - OTUs, character weighting and coding; cluster analysis; phenograms, cladograms (definitions and differences).
Role of herbarium and botanical gardens; methods of making herbarium sheets; important herbaria and botanical gardens of the world and India.

Unit-4: Identification and Nomenclature: **(16 Lectures)**

Flora, 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; Binomial system of nomenclature, typification, author citation, valid publication, principle of priority.

PRACTICAL

1. To determine minimum number of quadrats required to estimate the plant density in a grassland ecosystem.
2. To study frequency and importance value index of plant species in a grassland ecosystem.
3. To estimate bulk density and porosity of grassland and forest soil.
4. To determine moisture content and water holding capacity of grassland and forest soil.
5. Determination of pH, and analysis of two soil samples for carbonates, chlorides, nitrates, sulphates, organic matter and base deficiency by rapid field test.
6. To estimate transparency, pH and temperature of different water bodies.
7. Preparation of identification keys from the available specimens.
8. Taxonomic description of the following families Malvaceae (*Malva /Althea*), Fabaceae (*Trifolium/Lathyrus*); Rosaceae (*Rosa / Potentella*); Asteraceae (*Helianthus / Taraxicum*); Solanaceae (*Solanum / Datura*); Lamiaceae (*Mentha / Nepeta / Salvia*); Liliaceae –(*Hamerocallis / Tulipa*) and Poaceae (*Avena / Poa*).

9. Mounting of properly dried and pressed specimens of 10 wild plants with herbarium label to be submitted in record book.

Suggested Readings

- Chapman, J.L. and Reiss, M.J. 1997: Ecology: Principles and Applications. Cambridge University Press, London.
- Colinvaux, P. 1993. Ecology. Jhon Wiley, New York.
- Dash, M.C. 1993. Fundamentals of Ecology Tata Mc Graw Hill Publishing Company, Ltd.
- Judd, S. Wlater et al. 2008. Plant Systematics: A Phyllogenetic Approach. Sinauer Associates, Inc. Sunderland, USA.
- Molles, M.C. Jr. 1999. Ecology: Concepts and Applications WCB/McGraw-Hill Company Ltd.
- Odum, E.P. and Barret, 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, Calfornia, 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: Theory and Applications. Printice-Hall Inc.
- Wilkens, G.E. 2004. Economic Botany: Principles and Practices. Kluwer Publishers, Netherlands.
- Sharma, P.D. 2010. Ecology and Environment. Rastogi Publications. Merut, India 8th Edition
- Singh, G. 2012. Plant Sytematics: Theory and Practice. Oxford & IBH Pvt. Ltd. New Delhi. 3rd Edition.
- Singh, J.S., Gupta, S.R. and Singh, S.P. Ecology, Environmental Science and Conservation. S. Chand Publishing Company.
- Rizvi, W. & JooG.N. 2017. Plant Ecology and Taxonomy. Ali Mohammad and Co. Srinagar.
- Saad, S.K., Thakur, A.K, Bassi, S.K. and Shah Imtiyaz A., 2017. Plant Ecology & Taxonomy for B.Sc. Semester-II as per CBCS