

(Semester V)

**Paper 11: ECOLOGY AND PHYTOGEOGRAPHY**

THEORY

**Unit 1: Introduction**

Basic concepts; Levels of organization.

**(1 lecture)**

**Unit 2: Soil**

Importance; Origin; Formation; Composition; Physical; Chemical and Biological components; Soil profile; Role of climate in soil development.

**(7 lectures)**

**Unit 3: Water**

Importance: States of water in the environment; Atmospheric moisture; Precipitation types (rain, fog, snow, hail, dew); Hydrological Cycle; Water in soil; Water table.

**(2 lectures)**

**Unit 4: Light, temperature, wind and fire**

Variations; adaptations of plants to their variation.

**(4 lectures)**

**Unit 5: Biotic interactions**

**(2 lectures)**

**Unit 6: Population ecology**

Characteristics and Dynamics.

**(4 lectures)**

**Unit 7: Plant communities**

Concept of ecological amplitude; Habitat and niche; Characters: analytical and synthetic; Ecotone and edge effect; Dynamics: succession – processes, types; climax concepts.

**(7 lectures)**

**Unit 8: Ecosystems**

Structure; Processes; Trophic organisation; Food chains and Food webs; Ecological pyramids.

**(5 lectures)**

**Unit 9: Functional aspects of ecosystem**

Principles and models of energy flow; Production and productivity; Ecological efficiencies; Biogeochemical cycles; Cycling of Carbon, Nitrogen and Phosphorus.

**(8 lectures)**

**Unit 10: Phytogeography**

Principles; Continental drift; Theory of tolerance; Endemism; Brief description of major terrestrial biomes (one each from tropical, temperate & tundra); Phytogeographical division of India; Vegetation of Delhi

**(8 lectures)**

## PRACTICALS

1. Study of instruments used to measure microclimatic variables: Soil thermometer, maximum and minimum thermometer, anemometer, psychrometer/hygrometer, rain gauge and lux meter.
2. Determination of pH of various soil and water samples (pH meter, universal indicator/Lovibond comparator and pH paper)
3. Analysis for carbonates, chlorides, nitrates, sulphates, organic matter and base deficiency from two soil samples by rapid field tests.
4. Determination of organic matter of different soil samples by Walkley & Black rapid titration method.
5. Comparison of bulk density, porosity and rate of infiltration of water in soils of three habitats.
6. Determination of dissolved oxygen of water samples from polluted and unpolluted sources.
7. (a). Study of morphological adaptations of hydrophytes and xerophytes (four each).  
(b). Study of biotic interactions of the following:
  - Stem parasite (*Cuscuta*)
  - Root parasite (*Orobancha*)
  - Epiphytes
  - Predation (Insectivorous plants)
8. Determination of minimal quadrat size for the study of herbaceous vegetation in the college campus, by species area curve method (species to be listed).
9. Quantitative analysis of herbaceous vegetation in the college campus for frequency and comparison with Raunkiaer's frequency distribution law.
10. Quantitative analysis of herbaceous vegetation for density and abundance in the college campus.
11. Field visit to familiarise students with ecology of different sites.

## ESSENTIAL READINGS

1. Odum, E.P. (2005). Fundamentals of ecology. Cengage Learning India Pvt. Ltd., New Delhi. 5<sup>th</sup> edition.
2. Singh, J.S., Singh, S.P., Gupta, S. (2006). Ecology Environment and Resource Conservation. Anamaya Publications, New Delhi, India.
3. Sharma, P.D. (2010). Ecology and Environment. Rastogi Publications, Meerut, India. 8<sup>th</sup> edition.
4. Wilkinson, D.M. (2007). Fundamental Processes in Ecology: An Earth Systems Approach. Oxford University Press. U.S.A.
5. Kormondy, E.J. (1996). Concepts of ecology. PHI Learning Pvt. Ltd., Delhi, India. 4<sup>th</sup> edition.