B. Sc. I year

Paper I **Forest Ecology and Biodiversity**

Unit 1- Forest Ecology

1. Definition of ecology, division of ecology, scope and importance of ecology in forestry and basic concept of forest ecology.
2. Ecosystem- structure, component and important ecosystems, forest grassland, desert and pond.
3. Ecological energetic- concepts of energy flow. Tropic structure, food chain, food web and ecological pyramids.
4. Forest communities- vegetational analysis, biomass, productivity and forest floor mass, litter decomposition, forest soil development and nutrient cycling.
5. Locality factors-
    a. Climatic factors- Solar radiation, wind, heat and temperature, factors determining the temperature as the basis of classification of vegetation, precipitation, rain fall, snow, frost and frost damages and preventive measures, effect of snow on forest vegetation, moisture, atmospheric humidity and evaporation.
    b. Topographic factors- configuration of land surface, latitudinal, altitudinal influence on solar radiation, temperature and rainfall, slope, aspect and exposure.
    c. Edaphic factors- soil development, formation, soil profile, physical and chemical properties of forest soil.
    d. Biotic factors- influence of plants competition, parasite, epiphytes, climbers, weeds, and influence of wild animals, influence of man and his domestic animals.
6. Succession- definition, causes and kind of succession, concept and mechanism of succession, primary succession, secondary succession and climax.
7. Forest hydrology.
8. Classification of forest- basis of classification, Champion and Seth's classification forest types of India and forest Types of Uttarakhand Himalaya.

Unit II- Biodiversity

1. Definition, scope and importance.
2. Regions of biodiversity.
3. Anthropogenic disturbances and biodiversity.
4. Ex- situ and in-situ conservation and hotspot areas.

Paper II- Silviculture and Silviculture system

Unit I- Silviculture

1. Definition of forest and forestry, silviculture and silvics, its scope and classification, relation of silviculture with forestry and its branches.

a. Tree morphology: root system- crown, branches and foliage, stem- buttressing and fluting, size of tree and root system, form of root, adaptability and mycorrhizae.

b. Tree growth- phenology, germination and establishment, seasonal progress of growth, height and diameter growth and reproduction.

c. Crop morphology- crown and canopy, crop height, crop bole form and diameter and crop density

2. Natural regeneration- object and methods of natural regeneration.

3. Artificial regeneration- object and methods of artificial regeneration.

4. Tending operation- weeding, cleaning and thinning.

5. Concepts of provenance, seed source, plus tree, seed orchards, seed certification and adaptations.

Unit II- Silviculture System

1. Clear felling systems, shelter wood system, uniform system, group system, irregular shelter wood systems, strip system, selection system, group selection system, accessory system, coppice system, coppice selection system coppice with standard system.

2. Growth characteristics, distribution, phenology, Silvicultural characters, regeneration methods, management and economic importance of the following species:

Conifers: *Abies pindrow, Picea smithiana, Cedrus deodara, Pinus roxburghii, P. wallichiana* and C*upressus torulosa*.

Broad leave: *Quercus sp., Acacia arabica, A. catechu, Dalbergia sissoo, Shorea robusta and Tectona grandis.*

Bamboos: *Dendrocalmus strictus*.

Exotics: Importance, role in forest economy, purpose of introduction, ecological factors, establishment and management of Eucalyptus, poplar and exotic conifers (*Pinus spp*).

Paper III- Plantation Forestry

1. Aims and objectives of plantation Forestry.

2. Seed source and seedling establishment- seed biology, seed source, stand and seed orchard, seed collection, extraction, storage and testing, seed germination, germination percentage and tree seedling establishment.

3. Nursery management- importance and objectives of nursery, preparation of plantation area, sowing, weeding and planting plan.

4. Nursery work- sites and area, seed bed, methods of sowing, quality of seeds, time of sowing, shading, watering and damping off, weeding, soil working and transplanting, plant containers, fertilization, micro-propagation and misting units.

5. Fencing and types of fencing, digging of pits and water conservation measures for different sites, soil fertilization in plantation and tending.

6. Failures of plantations- reasons for failure and remedial techniques.

7. Afforestation of problematic sites- drought prone, arid, marshy, saline land, sandy soils and Suitable species for plantation of these sites.