Ph.D. Forestry and Biodiversity

RET Syllabus

Tripura University

RET Syllabus of the PhD Forestry and Biodiversity

I - Basic Forestry

1. Overview of Forestry in India

History of management and development of system of management of forest in recent years.Historical evolution of forest policy; Tangible/ Intangible benefits, forestry resources.

2. Forest Ecology

Basic principles and concept of forest ecology, Major abiotic and biotic components, food webs,ecological pyramids and energy flow, ecological successions, forest community concepts; Foresttypes in India, Conservation of forest ecosystems.

3. Systematic Forest Botany and Ethno-botany

Importance of Systematic botany in forestry; concept of species, genus; dendrological approach on classification of forest species; herbarium, arboretum; Ethno botany of forest flora of economic importance; plant nomenclature; Identification of species.

4. Forest Biotechnology

Aims and objectives of Tissue Culture for genetic improvement through clonal propagation, production of in vitro variability, transgenics, somaclonal variation, genetic fusion of cells.

5. Soil Science & Soil Conservation

Forests Soils, classification, factors affecting soil formation; physical, chemical and biological properties. Soil reaction – soil pH and its relation to nutrient availability.
Soil conservation - definition, causes for erosion; types- wind and water erosion; conservation and management of eroded soils/ areas, wind breaks, shelter belts; Role of forests in conserving soils.

6. Forest Hydrology & Watershed Management

Introduction, Hydrological cycle, Rainfall – runoff process, Interception, forest & water, run-off, water holding capacity of soils, free water, field capacity, capillary water, hydroscopic water, ground water, Watershed Management – approach and concepts of watershed; watershed management, its objectives;

7. Silvicultural Practices

Definition of silvics and silviculture, Study of locality factors like climatic, edaphic, Forest regeneration, natural and artificial regeneration of forests (plantation forests) and mixed regeneration; methods of propagation, grafting techniques; site factors; nursery and planting techniques – nursery beds, polybags and maintenance, water budgeting, grading and hardening of seedlings, pruning and lopping. Thinning – thinning of irregular crops, increments felling, improvement felling.

Silvicultural system – definition, classification and detailed study of the following systems: Clear
felling system; uniform system; the group system; coppice with standard system;

8. Forest Management, Forest Mensuration and Remote Sensing

Forest Management – Objective and principles; techniques; management of forest plantations. Forest Mensuration and Remote Sensing: Introduction – definition, objectives and scope. Measurement of single tree – object, place of measurement, Methods of measuring – diameter, girth, height, crown and volume of trees; form – factor; volume estimation of stand, current annual increment; Forest cover monitoring through remote sensing; Geographic Information System for management and modeling.

9. Forest Protection and Forest Economics

Agencies causing forest damage viz. man, fire, cattle, wildlife, insects and pathogens nature of their damages, cause, prevention, remedial measures and benefits. General forest protection against fire, equipment and methods, controlled use of fire. Grazing regulations; effect of wild animals on forest regeneration.

Forest economics: - fundamental principles, cost – benefit analyses; estimation of demand and supply; Socio – economic analyses of forest productivity and attitudes; valuation of forest goods
and service. Basic knowledge of forest pathology and forest entomology – definition, scope and
damage.

10. Wood Technology

Anatomical structure of wood, defects and abnormalities of wood, timber identification – general
principles. Different types of Wood seasoning and preservation; Pulp-paper and rayon; Wood substitution.

11. Non- Wood Forest Products

i. NWFP – Definition, Importance, Diversity / Types, their distribution, Role in rural livelihood and industry, present utilization and future scope.

ii. Introduction about natural products chemistry; General procedures for isolation of extractives, and other secondary metabolites from wood and NWFP; Value addition chemical from forest plants.

12. Biodiversity and Environmental Conservation:

Forest Biodiversity, its protection, components and principles of conservation, Climate Change, Clean development Mechanism, Carbon Trading, Pollution types, global warming, green house effects, ozone layer depletion, Forest and environment impact assessment and control measures. National conservation strategies. I. F. A. Overview on national strategies and

international conventions related to forest conservation and management (CBD, UNFCCC, NBA, CITES etc.)

13. Forest Genetics and Tree Improvement

Forest Genetics and its applications. Concept of tree improvement, methods and techniques. Variation and its use, provenance trials. Quality seed production through seed production area and seed orchards. Establishment and management of seed orchards. Genetic testing through progeny tests. Selection and breeding for resistance to diseases, insects and adverse nvironment; the genetic base, forest genetic resources and gene conservation in situ and ex-situ. Essential of seed testing, seed quality evaluation, seed dormancy, seed storage, seed classification and seed certification.

14. Extension Forestry

Extension Education – meaning, definition, objectives, principles, and characteristics. Extension programmes of major institutions. Major elements involved in forest extension.

15. Agroforestry

Agroforestry – scope and necessity; Agro forestry systems under different agro – ecological zones