B.Sc. (CBCS) Forestry - I year
Semester-I - Paper-I
Fundamentals of Silvi Culture, Silvi Culture of Trees, Agro, Social and Urban Forestry

Theory Syllabus

Credits- 4
(60 hours)

UNIT – I : Fundamentals of Silvi Culture

1. Study of Forestry and its significance of (production and protection, amelioration and recreation, education and development) (4h)
2. Vegetation forms of India (Vegetation of mountains, tropical rain forest, Desert, Tropical Decidious Forest, Scrub Forest and Mangrove forest) (4h)
3. Silvi culture systems: Clear felling, Uniform shelter wood, Selection, Simple coppice and Coppice with standard system. (6h)

UNIT – II : Factors effecting forest

1. Factors effecting forest:
   i. Edaphic factors: Definition – Soil formation – Factors effecting soil formation – Soil profile – Soil composition – Soil texture – Soil structure – Nutrient level of soil – Mineral cycle – Soil water – Various forms of water present in soil – Field capacity – Soil organic matter – Soil reaction or soil pH – Forest soil types of india. (6h)
   ii. Climatic Factors: Solar radiation – Effect of light on vegetation – Heliophytes – Sciophytes -Types of precipitation (Rainfall, Dew, Mist, Snowfall etc.) – Rainfall in India – Hydrological cycle – Micro climate. Effect of temperature on vegetation – Frost & its injuries – Wind and its effects on vegetation. (6h)
   iii. Biotic factors: Relationship between plant and plant, plant and animal and plant and human (shifting cultivation, encroachment and illicit felling, grazing and browsing, forest fires and its injuries, manipulation). (2h)
   iv. Physiographic factors: Altitude, slope, direction of mountain, exposure to light and valleys effect of vegetation. (2h)

UNIT – III : Silvi Culture of Trees

1. Silvi culture of some economically important species in India – Acacia nilotica, Azadiractra indica, Bamboo spp, Casurina equisitifolia, Cedrus deobara, Dalbergia Sissoor, Dalbergia latifolia, Pinus roxbrghii. Populus spp, Pterocarpus marsupiam, Santalum album, Simaruba glaca, Shorea robusta, Tectona grandis and Terminalia tomentosa. (10h)
2. Silvi culture of Mangrove: habitat and characteristics, silvi culture systems for mangroves, importance of mangroves. (3h)
3. Silvi culture of Cold desert: characteristics, identification and management of species. (3h)

UNIT – IV : Agro, Social and Urban Forestry

1. Agro Forestry – Definition, aims, Objectives - Scope and necessity – Classifications – Traditional agroforestry systems: Tangya system, Shifting cultivation, wind break, shelterbelts, Homestead gardens, Alley cropping Benefits. (6h)
2. Social Forestry / Urban Forestry - Objectives - Scope and necessity – Classifications – Benefits. (6h)
3. General topics – JFM (principles, objectives, scope, benefits and role of NGOs), VSS. (2h)

B.Sc. (CBCS) Forestry - I year
Semester-II - Paper-I
Forest Ecology, Biodiversity and Forest Mensuration

Theory Syllabus

Credits- 4
(60 hours)

UNIT – I : Forest Ecology

1. Concepts of ecology - Abiotic – Biotic components of ecosystems – Forest ecosystems (Grassland Forest and desert ecosystems) – Tropical level - Food chain – Food web – Energy flow in ecosystems – Ecological pyramids (Number, energy and biomass pyramids) (6h)
2. Forest types of india with special reference to the forest types of Telangana (4h)
3. Community ecology – Plant succession – Kinds of succession – Climax theory - Process of succession – Hydrach and Xerach. (4h)

UNIT – II : Biodiversity and environmental conservation

1. Biodiversity concepts - Kinds of biodiversity - Levels, threats and value of biodiversity – Conservation of biodiversity (4h)
2. Environmental policy and legislation in India. Environmental impact assessment (4h)
3. Pollution – types of pollution – air, water, noise and soil pollutions (causes, prevention and control measures) (4h)
4. Global warming, Green house effects, Ozone layer depletion, acid rains – impacts and control measures. (4h)

UNIT – III : Forest Mensuration - A

1. Elementary account of forest mensuration – its objectives and scope (3h)
2. Single tree measurement – measurement of diameter and girth – bark thickness – measurement of height (instruments worked on similar triangle principles, trigonometric principles) – basal area – form factor – stump and stem analysis (10h)
3. Crop measurement – introduction – determination of diameter – diameter of crop, height of crop, age of crop and volume of crop (3h)

UNIT – IV : Forest Mensuration - B

1. Determination of growth of trees: definition of increment – classification of increment (C.A.I, M.A.I and P.A.I) relationship between C.A.I and M.A.I. (6h)
2. Sampling – relative advantages of sampling kinds of sampling – random and non-random sampling (6h)
3. Elementary account on volume table – local volume table and yield table (2h)

B.Sc (CBCS) Forestry – II Year

Semester –III- Paper –III

Advance Silviculture, Propagation Techniques, Tree Improvement & Seed Technology

Theory Syllabus

Credits-4
(60 Hours)

UNIT- I: Advance Silviculture : Part -1

1) Tree morphology: Forms of Crown- Branching – Stem forms like(Tapper, Buttressing, Fluting and Forking) -2hrs
2) Growth of Trees and Crops: Growth of Trees – Height growth and Diameter growth . Crop growth(Diameter and Height growth of crops) – Growth in Volume- Phenology- Growth rings. -(4 hrs)
3) Crops morphology: Differentiation on the basis of age(Even aged and Un- even aged crops)- Advantages of even aged and Un- even aged crops. Differentiation on the basis of composition(Pure and Mixed crops)- Advantages of pure and mixed crops- Differentiation on the basis of Density. Canopy Classification-Crown classification. -6 hrs
4) Natural regeneration:- Natural regeneration by seed (seed production, Seed dissemination, seed germination and seedling establishment). Natural regeneration by vegetative parts (copies and root suckers) – Natural regeneration for important forest plants:- eg. Chir, Deodar, Teak, Sal, Bamboo, - 6 Hrs.

UNIT-II: Advance Silviculture Part-2

1. Artificial regeneration: objectives of Plantation – Site selection and Maintenance – Choice of species (Fast and slow growing species, Indigenous and exotic species) – Method of Planting – Spacing in between plants. Artificial generation Vs. Natural regeneration. - 6 Hrs.
2. Tending operations – Weeding – Cleaning- Thinning – Objectives and Methods of thinning (Mechanical, Ordinary, Crown, Free, Advance, Numerical thinning) – Improvement felling- Pruning (Natural and Artificial pruning) Climber cutting – Singling. - 6 Hrs.
3. Afforestation : Objectives of Afforestation of difficult sites : Mined areas, Shallow black cotton soils, Wet lands – Coastal lands – Road side plantation – Plantation along canals. -4 Hrs.

UNIT-III – Propagation Techniques:

1. Vegetative Propagation : Importance of vegetative propagation – Methods of vegetative propagation – Cutting – Layering (Ground layering, Air layering) Grafting (Approach, Side, whip, Cleft grafting and Bud grafting). - 4 Hrs.
2. Nursery Techniques – Need of Nursery- Kinds of Nursery – Selection of site – Lay out of Nursery, Nursery size – Soil working for Nursery – Seed beds (Raised and Sunken beds) – Containers for plant propagation (Poly bags ,Root Trainers) – Hardening of seedlings and Transplanting . - 6 Hrs.
3. Elementary Account on the Tissue culture and its application in forestry – Clonal forestry: Clonal techniques- CMA (Clonal Multiplication Areas) - - 4 Hrs.

UNIT-IV – Tree Improvement & Seed Technology:

1. General concept of Tree Improvement – Objectives of Tree Improvement – Methods and techniques. Variations and its use in Tree Improvement. - 4 Hrs.
2. Tree improvement in Natural forest and stand improvement. Genetic testing programming – Selection and breeding for resistance to diseases, insects and adverse environment. Forest genetic resources and gene conservation in situ and ex- situ. Principles and establishment of Arboreta. - 6 Hrs.
3. Seed production and seed orchards – Seed collection and Handling – Seed Testing Seed storage - 4 Hrs.

B.Sc (CBCS) Forestry – II Year

Semester –IV- Paper –IV

Wood Anatomy, Soil Erosion and Soil Conservation, Watershed Management, Forest Legislation and Laws

Credits-4
(64 Hours)

UNIT- I: Wood Anatomy: Part -1

1) Hard wood vs soft wood-sap wood vs heart wood-Tylosis-Wood Rays -2hrs
2) Physical and Anatomical features helpful for non-porus wood It's Significance in identification of species, Resin Canals e.g. Pinis, Deodar. -(4 hrs)
3) Physical and Anatomical features helpful for identification of porous wood-wood parenchyma-Ripple marks and other depositions of wood. -6 hrs
4) Anatomical wood defects (Knots and Shakes) and abnormalities-seasoning defects Warping, (Cupping, Bowing, spring and Twist), - 6 Hrs.

UNIT-II: Soil Erosion and Soil Conservation Part-2

1. Soil erosion-Definition-Causes of Erosion-types of Erosion-Role of Forestry in Soil conservation.. - 2 Hrs.
2. Wind Erosion-Factors effecting wind erosion-Causes of Wind erosion in forest areas-Soil conservation techniques of wind erosion-Shelter belts and wind breaks. - 6 Hrs.
3. Wind Erosion control with special reference to Rajasthan desert-sand dunes-types of sand dunes -6 Hrs.
4. Water Erosion-Factors effecting-water erosion, causes of Water erosion in forest areas- Soil conservation techniques of water erosion like Checkdams-Countour trenches and bunds -2 Hrs

UNIT-III – Watershed Management:

1. Hydrology-Weather and Hydrology(Rainfall and Types of Rain fall) Hydrologic properties-Infiltration,runoff,Water holding capacity of soils. - 6 Hrs.
2. Watershed management-Principles and objectives of Watershed, Concepts of watershed management-Steps in Watershed Management-Benefits of watershed management.- 6 Hrs.
3. Water harvesting-Methods of water harvesting-Rain water harvesting-Ground water recharge (Surface methods, Sub surface methods, Induced recharge) - - 2 Hrs.

UNIT-IV – Forest Legislation and Laws:

1. Indian Forest Policy of 1894,1952 and 1990. National forest policy 1988(Peoples involvement). - 6 Hrs.
2. Forest Policies and issues related to land use, Timber and Non timber forest products, Sustainable forest management, and Industrialization policies. - 4 Hrs.
3. Forest laws-Necessity, General Principles-Indian Forest Act-1927,Forest Conservation Act-1980,Wild life protection Act-1972 and their amendments -6 Hrs

B.Sc. (CBCS) Forestry- III year
Semester-V-core paper-5
Forest utilization, wood science and technology, wood preservation, Ethno botany, medicinal and aromatic plants.
Theory syllabus

credits-3
(45 hours)

UNIT-I : Forest utilization

1. **Forest harvesting practices**-Logging- Extraction techniques and Principles- Transportation and storage-Disposal and sale. **(3h)**
2. **Non-timbers forest products**-(NTFP'S)- Definition and scope and uses of-gums- Resins- Oleoresins- Fibers- Oil seeds- Rubber- Canes- Bamboo- Dyes- Essential oils**.** **(8h)**
3. **Non-timber forest products based industries**- Paper and pulp manufacturing, cutch and katha extraction, Beedi leaves collection and manufacturing, Charcoal burning and uses, Resin tapping and manufacturing of turpentine oil and resin. **(4h)**

UNIT-II: Wood science and technology

1. **Wood seasoning** general principles of seasoning, seasoning behavior of woods, Methods of seasoning, Air seasoning, Kiln seasoning (steam heated and electric kilns).
   Solar dehumidification. **(4h)**
2. Present status of composite wood industry in India-utilization of plantation wood- Problems and possibilities. Energy plantation. **(3h)**

3. **Composite wood products**

a. Adhesive manufacturing and uses- Phenol formaldehyde resin-PF, Urea formaldehyde resin-UF, Melamine formaldehyde resin- MF.4h

b. Plywood, Particle board , Fiber board manufacturing properties and uses. Block board and Flush door manufacturing properties and uses**.** **(4h)**

UNIT-III: Wood preservation, ethno botany, medicinal and aromatic plants

Wood preservation-objectives and advantages, classification-water soluble, oil type and organic solvent type**.** **(7h)**
Methods of application of preservative

a. **Non pressure methods** (Soaking process, Diffusion process, Steeping process , Hot soaking, Heating and Cooling, Boucherie and modified broucherie method)
b. **Pressure methods**- Full cell process, Empty cell process, Lowry process, Rueping process-alternate pressure method.

2. **Ethanobotany-** **(5h)**
   i) Importance of ethanobotany, role of ethanobotany in Indian systems of medicines- Ayurvedha, Siddha and Unani systems.
   ii) Principles and establishments of botanical gardens, Herbaria and Arboreta.
3) **Medicinal and aromatic plants**-Scope, opportunities and constraints in the cultivation and utilization of medicinal and aromatic plants in India. **(3h)**

Reference books

- Utilization by Tribhuvan mehtha.
- Text book of silviculture by Chathurvedi, L.S. Kanna.
- Break through approach for forest service's by Manikandhan and Prabhu.
- Principles of wood science and technology by Kollman volume-I, Kollman volume-II, Franz F.P, Cote, Wilferd A.Jr.
- Additive manufacturing by Gibron(etal) 2015.
- Forest utilization by Robert scott trop, Carl Alwin Schench.
- Ethno botany by Amritpal sign saurya.
- Indian ethno botany Bibliyography of 21st century by Amita jain, S.k. Jain.

  Medicinal and aromatic crops by Bhani Ram Dall, Mamta dall, kapil sihag.
- Ethno botany by C. Dhatha.
- Ethno botany and medicinal plants of Indian sub-continent by Maheshwari J.K.

B.Sc.(CBCS) Forestry-III year
Semester-V-Elective paper-I
Fundamentals of wild life, wild life management and wild life conservation
Theory syllabus

CREDITS- 3
(45 hours)

UNIT-I: FUNDAMENTALS OF WILDLIFE

1. Animal diversity and general characters of Reptilia, aves and mammals. Difference between poisonous and non poisonous snakes, flying and non flying birds. **(3h)**
2.
   a. Importance of wildlife. **(2h)**
   b. An elementary account of zoogeographic distribution of world and India. **(4h)**
3.
   a. Classification, description and distribution of wildlife in India.
   b. Elementary account on some important species- Lion, Tiger, Bears, Elephant, Rhinoceros, Kashmir stag and great Indian bustard. **(6h)**

UNIT-II: WILDLIFE MANAGEMENT TECHNIQUES

1. **Wildlife management techniques**- food, water, cover management, Wetland improvement, fences and trenches, other habitat improvement measures. **(4h)**
2. Endangered species-causes, IUCN(International union for conservation of nature) classification(red list categories), examples of threatened species of reptiles, birds and mammals of India, red data book. Endemism. **(3h)**
3. **Wildlife census** - purpose, techniques. Direct methods (roadside index, dung surveys, water hole survey, calls, fixed-visibility transits and pug mark count method) and indirect methods (camera traps and radio caller census). **(8h)**

UNIT-III: Wildlife conservation

1. **Insitu conservation** **(8h)**
   a) National parks (important national parks like Corbett, Kanha, Ranthambor, Bandipur, Gir, Khaziranga national parks).
   b) Sanctuaries of India (Periyar, Sariska, Nagarjuna sagar sanctuary, Manas wildlife sanctuary).
   c) Biosphere reserves of India. Hotspots in India.
2. **Exsitu conservation**- zoo parks and safari parks, Captive breeding for Conservation, Gene bank.
3. Special projects wildlife conservation like Project tiger, Musk deer project, Gir Lion project, Project Elephant. Wildlife corridors. **(3h)**
4. Agencies involved in wildlife conservation, Wildlife Institute of India(WII), World Wildlife Fund for nature (WWF), Bombay National history society(BNHS), Wildlife preservation society of India(WLPSI), Conservation on International Trade in Endangered Species (CITES), Indian Board for Wildlife(IBWL). **(4h)**

Reference book:

- Rajesh Gopal's fundamentals of wildlife management by Rajesh Gopal
- Wildlife management –the basics by Paul r. Krausman
- Wildlife management techniques by Sanford D. Schemnitz
- Wildlife management techniques by Dr. S.S. Negi
- Wildlife conservation theory by Robert. A. Mc Cleery
- Wildlife conservation and management by Paul. R. Kraunsman
- Book of Indian birds by Saleem ali
- Indian wildlife sanctuaries and national parks by S.K. Tiwari

B.Sc.(CBCS) Forestry-III year
Semester-V-Elective-II
3rd year theory syllabus
Forest economics, forest business management

Credits-3
(45Hours)

UNIT-I: FOREST ECONOMICS

1. Fundamental principles-cost benefits analysis; Estimation of demand and supply; Analysis of trends in the national and international market and changes in the production and consumption patterns; Assessments and projection of market structures. **(9h)**
2. Role of private sector and co-operatives; role of corporate financing. **(3h)**
3. Socio-economic analysis of forest productivity and attitudes; Valuation of forest goods and service. **(3h)**

UNIT-II: FOREST BUSINESS MANAGEMENT-1

1. Nature and scope of business management as related to forestry forms of business organization, vertical and horizontal integration. Key functions and areas of management in forestry business. Approaches to management. **(8h)**
2. Production planning-land use planning, marginal analysis; break even analysis; methods, Business size and Economics of scale. **(4h)**
3. Production control-control information, Control charts, Physical records, role of good record keeping. **(3h)**

UNIT-III: FOREST BUSINESS MANAGEMENT-2

1. **Financial planning**-sources of finance, Returns to capital, Repayment schedules, Depreciation, capital investment appraisal, budgeting techniques.**(7h)**
2. **Financial control**- Cash analysis, Financial statements and Financial ratios. Work planning- Personal management, Labor problems and measurements, Work allocation, Raising labor productivity. **(4h)**
3. **Staff control**- Work progress charts, Supervisory management, Leadership and leadership styles, Good labor relations, Training needs, Employee records and reward structures. Marketing strategies, Planning and control. **(4h)**

Reference book

- Forest economics by Peter Breck-2014
- Forest economics by Daowei Zhang and Pearse Peter
- Forest economics and evaluation by Madhanmohan panth
- Forest business management and entrepreneurship by Franz Schmithusen, Bastian Kasier, Albin Schmidhauser
- Forest business management by Stephan Mellinghoff, Karoline Perchaler

B.Sc.(CBCS) Forestry III Year

Semester –VI- Paper-VII(core paper)

Forest management, Forest working plan and Yield regulation, Forest survey and engineering

Theory syllabus

(Credits-3)

(45 hours)

UNIT-I: FOREST MANAGEMENT

1. **Forest management**-definition and scope, objects of management, forest organization: geographical and climatic classification, functional classification, legal classification, territorial classification, administrative classification and management classification: working circle, felling series (coupes and cutting section), periodic blocks, felling cycle. (3h)
2. i. **Distribution of age gradations and age classes**- definitions, normal age gradations/ classes in regular forests and irregular forests. (2h)
   ii. Sustained yield-concept and principles, scope and limitations, advantages and dis advantages. Concept of progressive yield. (2h)
   iii. Rotation- definition, types of rotation (physical and silvicultural rotation, technical rotation and rotation of maximum volume production, rotation of highest income and Financial rotation) choice of kinds of rotation. (2h)
3. i. Normal forest- definition, basic factors of normality and kinds of abnormality. (2h)
   ii. Increment- definitions, current and mean annual increment, relationship between CAI and MAI, Increment percent- Pressler's formula, quality and price increment , effect of thinning on volume increment. (2h)

iii. Growing stock- definition, normal growing stock (NGS) – in clear felling system, in shelter wood system and selection system. Relation between Growing stock and yield. (2h)

UNIT-II: FOREST WORKING PLAN AND YIELD REGULATION

1. Forest working plan- introduction, definition, objectives and scope, unit of working plan, who should draw- up working plan, period of working plan. (5h)
2. Preparation of working plan- preliminary working plan report, secondary- preliminary report, field work, stock mapping, annual plan preparation. (5h)
3. Yield regulation- definition, principles and objectives, types of yield- intermediate and final. Yield regulation in regular forest and irregular forest. (5h)

UNIT-III: FOREST SURVEY AND ENGINEERING

1. a)Forest survey: Different methods of surveying- chain, plain table and prismatic compass survey.
   b) Map - kinds of map, map reading and application of map reading in forestry .

2. a) Aerial photography and applications in forestry. (6h)
   b)Remote sensing- definition, application,advantages , energy sources .
   c)Geography information system (GIS)- advantages, components, application.
   Global positioning system(GPS)- advantages, segments and applications. (5h)
3. Forest engineering- basic principles of forest engineering, building materials and constructions. Roads and bridges- general principles, objects, types, simple design and construction of timber bridges. (4h)

B.Sc.(CBCS) Forestry III Year

Semester –VI- Paper-VIII (Elective-III)

FOREST PROTECTION AND PATHOLOGY

THEORY SYLLABUS **CREDITS-3**

HOURS-45

UNIT-I : FOREST PROTECTION-1 **(5h)**

1. Injuries to forest by A biotic factors like climatic elements and their protective measures. (wind , frost and drought).
2. **Biotic factors –** biotic factors like wild animals, human activities (5h) (Shifting cultivation, Encroachment, Illicit felling, Defective management), causes , preventive and control measures .
3. Susceptibility of damage to forest by pollution, nature of damage, prevention and control measures by chemical and biological control . (5h)

UNIT-II : FOREST PROTECTION-2

1. **i. Forest fires-** types, causes, protection against fire. Prevention and controlling methods. Benefits of forest fire. (2h)
2. Effects of wild animals on forest regeneration.
   i)Grazing and browsing. Damage caused by grazing. Rotational and control grazing, (3h)
3. Role of forest in carbon sequestration, carbon management, carbon foot print and carbon credit . (4h)

UNIT-III : FOREST PATHOLOGY

1. **i)** Symptoms and signs of fungal, viral and non-parasitic diseases. (4h)

   ii) Decay- Types of decay, gross characters of decay and its control.
2. **Nursery Diseases-** Nursery diseases and its management – seed diseases and control measures , seedling diseases and control measures .Disease management strategies in nursery pest management in forest nursery. (4h)
3. Diseases of some economic important forest species and their control measures- **TEAK, SAL, SHISHAM, SANDAL WOsOD, EUCALYPTUS.** (10h)

B.Sc.(CBCS) Forestry III Year

Semester –VI- Paper-VIII(Elective paper-IV)

FOREST LEGISLATION AND LAWS, ENVIRONMENT POLICY AND LEGISLATIONS

THEORY SYLABUS **(45HOURS)**

Credits-3

UNIT-I: FOREST LEGISLATION AND LAWS-1

1. **FOREST POLICY-** definition, necessity, and scope, legal and institutional approaches to forest management. (3h)
2. **Indian forest policies** of 1894, 1952 and 1980, 1988 peoples involvement (joint forest management, involvement of women). (8h)
3. forest products, sustainable forest management, industrialization policies. (4h)

UNIT-II: FOREST LEGISLATION AND LAWS-2

1. **FOREST LAWS-** necessity, general principles, Indian forest act 1927- Telangana state forest acts and rules. (4h)
2. Forest conservation act 1980, wildlife protection act 1972 and their amendments. (6h)
3. Application of Indian penal code to forestry. Scope and objectives of forest inventories.(3h)

UNIT-III: ENVIRONMENTAL POLICY AND LEGISLATION

1. . Environmental (protection) act 1986 . National environmental policy 2006. (4h)
2. Water(prevention and control of pollution act)1974.
   Water (prevention and control of pollution act) cess act 1977.
   Air (prevention and control of pollution act) 1981. (8h)
3. Municipal solid waste (management and handling) rules 2000. Biomedical waste (management and handling) rules 1998. Hazardous material (management and handling and trans-boundary movement) rules 2008. (5h)