DEPARTMENT OF FORESTRY

B. Sc. Forestry (TDC)

(Semester System)

SYLLABUS

3-Year Programme

(03-Paper Pattern)

KUMAUN UNIVERSITY

NAINITAL

B. SC. FORESTRY

Course Outline

Paper	Paper Code	Paper Title	Max. Marks (Ext+Int)
		Semester – I	
I	6103	Forest Ecology	60 + 20 = 80
II	6104	Forest Biodiversity and Forest Types	60 + 20 = 80
III	6105	Principles of Silviculture	60 + 20 = 80
		Practical	45 +15 = 60
		Semester – II	
I	6203	Silviculture of Indian Trees & Silviculture Systems	60 + 20 = 80
II	6204	Nursery Management	60 + 20 = 80
III	6205	Agroforestry and Social Forestry	60 + 20 = 80
		Practical	45 +15 = 60
		Semester –III	
I	6303	Forest Menstruation	60 + 20 = 80
II	6304	Environmental Science and Forest Laws	60 + 20 = 80
III	6305	Forest Management	60 + 20 = 80
		Practical	45 +15 = 60
		Semester - IV	
I	6403	Wildlife Management	60 + 20 = 80
II	6404	Plantation Technology	60 + 20 = 80
III	6405	Wood Science & Technology	60 + 20 = 80
		Practical	45 +15 = 60
		Semester -V	
I	6503	Forest Pathology	60 + 20 = 80
II	6504	Forest Entomology	60 + 20 = 80
III	6505	Forest Logging and Utilization	60 + 20 = 80
		Practical	45 +15 = 60
		Semester - VI	
I	6603	Forest Physiology	60 + 20 = 80
II	6604	Biostatistics	60 + 20 = 80
III	6605	Forest Genetics and Tree Improvement	60 + 20 = 80
		Practical	45 +15 = 60

I- SEMESTER

Paper I: Forest Ecology (60+20 marks)

Definition, division, scope and importance of ecology in forestry and basic concept of forest ecology. Ecosystem-structure, components and important ecosystems, forest grassland, desert and pond Ecosystem. Ecological energetic- concepts of energy flow, Tropic structure, food chain, food web and ecological pyramids. Forest communities- vegetational analysis, biomass, productivity and forest floor mass. Climatic factors- Solar radiation, temperature, precipitation (rainfall, snow and frost) and frost damage, Moisture, atmospheric humidity and wind. Topographic factors, Edaphic Factor, Biotic factors- influence of plants competition, parasite, epiphytes, climbers, weeds, and influence of wild animals, influence of man and his domestic animals. Plant Succession- causes, mechanism of succession, kind of succession, primary succession, secondary succession and climax.

Paper II: Forest Biodiversity and Forest Types (60+20 marks)

Definitions, scope and importance of biodiversity. Regions of biodiversity. Assessment of biodiversity, threats to biodiversity. Threats to Biodiversity: Ex- situ and in-situ conservation and hotspot areas. Biodiversity conservation, Species of red data book. Classification of forest – basis of classification, Champion and Seth's classification of Forest types of India and forest types of Uttarakhand Himalaya.

Paper III: Principles of Silviculture (60+20 marks)

Definition of silviculture and silvics, its scope and classification. Relation of silviculture with forestry and its branches. Form and growth trees- Tree morphology: root system, form of root, adaptability and mycorrhizae, crown, branches and foliage, stem- buttressing and fluting. Tree growth: stages of growth phenology, germination and establishment. Seasonal progress of growth, height and diameter growth and reproduction. Forest regeneration - Natural regeneration and methods of natural regeneration. Artificial regeneration and methods of artificial regeneration. Tending operation- weeding, cleaning and thinning.

Practical (45+15) 60 Marks

- Practical will includes all the exercises as given by respective subject teachers covering all the theory papers.

II -SEMESTER

Paper I: Silviculture of Indian Trees & Silviculture Systems (60+20 marks)

Distribution phenology of trees, Growth characteristics, 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 spp: Dendrocalmus strictus* and *Dendrocalmus hamiltonii* Exotics: Importance, role in forest economy, purpose of introduction, ecological factors, establishment and management of Eucalyptus, poplar and exotic conifers (*Pinus spp*). Definition and classification of systems. 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**.**

Paper II: Nursery Management (60+20 marks)

Definition, importance and objectives of nursery, classifications, nursery 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 etc. Nurse crop, cover crops and mulching. Digging of pits and water conservation measures for different sites. Plantation organization and structure; reasons for failures of plantations, types of plantation, types and pattern of planting.

Paper III: Agroforestry and Social Forestry (60+20 marks)

Definition, objectives, scope and constrains of agroforestry. Choice and characteristics of species for agroforestry. Multipurpose tree (MPTs) in Agroforestry, crop interaction, Soil Productivity aspect of Agroforestry and economic aspect of Agroforestry. Agroforestry systems. Socio-economics and ecological aspect of Agroforestry. Management of trees in Agroforestry, diagnosis and design techniques, Lopping cycle fodder values of trees, alley and hedge cropping, Introduction, objectives, concept, scope and types of social forestry. Social forestry practices. Income and employment, important social forestry tree species, exotic species and their nurseries. Role of social forestry in rural economy, social forestry in relation to agriculture and environment.

Practical (45+15) 60 Marks

- Practical will includes all the exercises as given by respective subject teachers covering all the theory papers.

III- SEMESTER

Paper I: Forest Menstruation (60+20 marks)

Definition, importance and principles of measurements, system of units and accuracy implied in their expression. Linear measurements- diameter and girth measurements, place and standard rules of breast height measurement, bark thickness and instruments used. Measurement of tree height, principles of height measurements, instruments used for measurement of height, height measurement under different field condition. Method of studying tree stem form- form factor, form quotient, form point and taper table. Measurement of volume of tree- definition, object, and measurement of volume of felled and standing trees, classification and use of volume tables. Age of trees: object and methods of determination of age of standing and felled trees. Growth of tree, measurement of growth by increment boring, growth curves. Increment, increment percent for diameter and volume.

Paper II: Environmental Science and Forest Laws (60+20 marks)

Definition and components- atmosphere, hydrosphere, lithosphere and biosphere. Natural resources and their management- forest, wildlife, water, and land resources. Environmental pollution-Types of pollutants, global warming, green house gasses, ozone layer depletion, acid rains. Control prevention of air, water and noise pollution. Role of trees and forest in environmental conservation, environmental monitoring and concept of sustainable development. Environmental policy and legislation in India- Wild life Protection Act 1972 amended 1991, Water prevention and control of pollution Act 1974. Air prevention and control of pollution Act 1981, Environmental protection Act 1986 and Biodiversity conservation bill. Environmental impact assessment. Definition and background of forest policy, laws and act. National forest policy 1894, 1952, 1988 and its modification in brief Indian forest Act 1927 and 2006, forest conservation Act 1980. Wildlife protection Act 1972 and its modification.

Paper III: Forest Management (60+20 marks)

Definition and scope, management of private forest vis-a-vis public forests, objects of management. Forest organization: Geographical and ecological classification, functional classification, legal classification, territorial classification, administrative classification. Sustained yield, increasing and progressive yield, and arguments for and against sustained yield principles. Increment- CAI and MAI curves, increment percent. Distribution of age classes and age gradation in even and uneven aged forest and growing stock. Normal forest- basic factors of normality, kinds of abnormality in regular and irregular forest. Yield regulation: Definition, principle and method of yield, area method. Von mental Method for yield regulation. Rotation: Definition and concept of rotation, types of rotation and conversion period.

Practical (45+15) 60 Marks

- Practical will includes all the exercises as given by respective subject teachers covering all the theory papers.

IV- SEMESTER

Paper I: Wildlife Management (60+20 marks)

Definition, concept and history of wildlife management in India, Rare, threatened and endangered species of India. Wildlife Sanctuaries, National Parks, Zoological parks and Biosphere reserves, Project tiger, project elephant, and wildlife legislation, Various Government and private agencies involved in wildlife conservation, wildlife values and conflict and protected area management. Important features of Tiger, Lion, leopard, antelopes, Black Buck, Rhinoceroses, Elephant, Alligators. Guidelines for declaration of Big Cats as man eaters.

Paper II: Plantation Technology (60+20 marks)

Definition, aims and objective of plantation forestry. Plantation organization and structure. Failures of plantations – reasons for failure and remedial techniques. Afforestation of problematic sites – drought prone, arid, marshy, saline land, sandy soils and suitable species for plantation of these sites. Seed technology – introduction, scope, seed sources and seedling established, seed biology and seed production. History of forest production in India. Seed germination, seed collection and handling. Seed stands, seed collection, storage and supply of seeds. Stump planting: advantages of stump planting and patterns of planting.

Paper III: Wood Science & Technology (60+20 marks)

Wood structure – gross structure of wood, cellular composition of bark, sap wood, heart wood and pith, early wood, growth rings, grain, texture and identification of wood. Physical properties of wood: weight, density, reaction of heat, sound, light and electricity on wood, thermal; expansion, moisture contain, porosity, colour, and wood working qualities. Mechanical properties of wood: standard test, special testing on wood store and timber products, non destructive testing of wood, factor influencing strength, hardiness, flexibility, elasticity, fissility and combustibility. Defects and abnormalities of wood: Natural defects, method of evaluation and measurement, influences of defects on conversion and utilization, defects during processing, manufacturing, seasoning and wood destroying agents. Seasoning of wood – principles and methods, air, solar and kiln seasoning. Wood preservation: causes and methods, different preservatives and their properties.

Practical (45+15) 60 Marks

- Practical will includes all the exercises as given by respective subject teachers covering all the theory papers.

V-SEMESTER

Paper I: Forest Pathology (60+20 marks)

Introduction and history of forest pathology. Introduction of various plants pathogens fungi, bacteria, viruses etc. Symptomology and identification of plant diseases. Classification of forest tree diseases and their control. Common diseases in forest trees root rot, heart rot, wilt, stem cancer, stem rust, die-back, galls, leaf spots, leaf blight, powdery mildew and leaf rust. Nursery diseases. Diseases caused by phanerogamic plant parasite like *Dendropththoe, Acanthobium, Lorenthous* etc. Principles of tree diseases control: cultural, chemical and biological control methods.

Paper II: Forest Entomology (60+20 marks)

Introduction and classification of insects (only forestry importance). Protection against injuries by plants-defoliating, sap sucking and mites, shoot, twig and root insects seed and cone insects, wood boring insects and gall markers. Methods of control against insects and pests- silvicultural, biological and chemical.

Paper III: Forest Logging and Utilization (60+20 marks)

Definition, scope and logging practices. Felling and conversion, felling tools, season of felling, method of felling and conversion. Transportation- major and minor transportation, storage and types of depots of timber, their management, extraction and disposal of timber. Minor forest products like grass oil, seed oil, tans and dyes, gum, resin, rubber, fibre and flosses, animals and minerals and other miscellaneous products. Medicinal plants- drugs species, edible and poisons, important medicine of Uttarakhand. Important forest industries- Paper and pulp, cutch and katha, bidi, furniture, sport goods, pencils, toys, plywood and match.

Practical (45+15) 60 Marks

- Practical will includes all the exercises as given by respective subject teachers covering all the theory papers.

VI- SEMESTER

Paper I: Forest Physiology (60+20 marks)

Introduction and practical application in forestry. Soil, water, absorption of water, water conducting system, transpiration, water stress and drought. Photosynthesis- pigments, mechanisms and factors affecting photosynthesis. Respiration- mechanism, glycolysis and kerb's cycle, anaerobic respiration and respiratory quotients. Growth and growth regulators, relative growth rate, plant hormones- auxins, gibberellins, cytokininis and ethylene.

Paper II Biostatistics (60+20 marks)

Definition its scope and importance in forestry, collection Classification and tabulation of statistical data, frequency distribution, diagrammatic and graphical representation of data Measures of central tendency: mean, mode, median, measures of dispersion, mean deviation, standard deviation and standard error. Simple correlation and regressions. Elementary idea on probability- additive and multiplicative theorems, binomial and normal distribution. Test of significance- based on normal, t and X^2 test. Sampling techniques – Simple, random, stratified and systematic sampling.

Paper III: Forest Genetics and Tree Improvement (60+20 marks)

Introduction and its application in tree improvement. Cell structure and function, chromosome structure and cell division. Mendel's law of inheritance, qualitative and quantitative characters. Tree breeding: control pollination, vegetative propagation, tissue culture, hybridization, polyploidy and maturation. Seed orchards and seed production area.

Practical (45+15) 60 Marks

- Practical will includes all the exercises as given by respective subject teachers covering all the theory papers.

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