DEPARTMENT OF FORESTRY

Ph. D. in Forestry

Entrance Examination

SYLLABUS

KUMAUN UNIVERSITY

NAINITAL

PH. D. IN FORESTRY

SYLLABUS OF ENTRANCE EXAMINATION

UNIT 1: FOREST ECOLOGY AND ENVIRONMENTAL SCIENCE

Definition, basic concept and importance of ecology in forestry; Ecosystem and concept of energy flow; Biodiversity uses and its conservation, hotspots, threats to biodiversity and convention of biodiversity (CBD); Biomass, productivity and forest floor mass, litter decomposition, forest soil and nutrient cycling; Concept and classical models of succession and climax; Factors of locality, basis of classification, distribution and forest types of India; Salient features of major world forest types; Role of forest in national economy, tribal and rural livelihoods; Natural resources, their management and ecosystem services; Environmental pollutions, global warming, effects of global warming, green house gases, ozone layer depletion and acid rain; Role of trees and forest in environmental conservation; environmental monitoring, concepts of sustainable development and Environmental Impact Assessment; Environmental policy and legislation in India: The Water (Prevention and Control of pollution) Act 1974, Forest Conservation Act 1980, The Air (Prevention and Control of pollution) Act 1980, Environmental protection act 1986 and biodiversity conservation bill.

UNIT II: SILVICULTURE AND SILVICS

Scope of silviculture and classification, form and growth of trees, natural regeneration and artificial regeneration; Tending operations-thinning, weeding, cleaning and lopping; selection and preparation of site for nurseries, nursery bed, management of nursery, planting pattern, methods of planting; choice of species and afforestation of difficult sites viz. saline, alkaline, coastal sands, lateritic soils, sand dunes, dry and rocky areas, cold desert.; Silviculture systems viz. Clear felling, shelterwood, uniform, group system, irregular shelterwood system, strip system, selection system, group selection system, accessories system, coppice system, coppice selection system, coppice with standard system; Silviculure of important tree species like Acacia, Sal, Shisham, Teak, Pinus, Deodar, Abies, Eucalyptus and Popular, Quercus, Albizia and Bamboos.

UNIT III: AGROFORESTRY, SOCIAL FORESTRY AND COMMUNITY FORESTRY

Concept of agroforestry, social forestry, community forestry and farm forestry; Benefits and constraints of Agroforestry; Historical development of agroforestry and overview of global agroforestry systems; Structural, functional, socio-economic and ecological classification of agroforestry systems; Diagnosis and design of agroforestry system; Land capability classification and land use; Criteria of an ideal agroforestry design, productivity, sustainability and adaptability; Multipurpose tree species and their characteristics suitable for Agroforestry; Plant management practices in Agroforestry, tree-crop interactions, ecological and economic, water and nutrient competition in Agroforestry; alleycropping and concept of allelopathy; Organic farming.

UNIT IV: FOREST MENSURATION

Definition, object and scope; Methods of measuring diameter, girth, height, bark thickness, stem form and volume of tree; classification of volume table, volume estimation of stands; Growth and increment of tree; Forest inventory, sampling methods; sample plot, survey, inventory preparation and photo interpretation; -concept and scope of GIS and remote sensing; Frequency distribution; Mean, median, mode and standard deviation; Normal, binomial and Poisson distribution; Correlation, regression coefficient and multiple regressions; Tests of significance- F and Chi square tests; Experimental designs -basic principles, completely randomized, randomized block, latin square and split plot design.

UNIT V: FOREST MANAGEMENT

Definition and scope; Concept of sustained yield, normal forest, rotation; Estimation of growing stock; density and site quality, Management of even aged and uneven aged forests; Yield regulation in regular and irregular forest by area, volume increment; Working plan and joint forest management; National forest policy 1894, 1952, 1988 and Indian Forest Act 1927; - introduction, definition and scope of forest economics, economic growth and development; demand function, demand and supply; market equilibrium, market principle and market structure; perfect competition, monopoly and price control; economics of timber products, Forest valuation-internal rate of return, present net worth and cost benefit analysis.

UNIT VI: FOREST PROTECTION

Definition and factors effecting forest protection; Man as source of injury to forest; deforestation, shifting cultivation, encroachment, mining, forest fire; protection against injuries by animals and protection against injuries by diseases; Classification of forest tree diseases and their control; Root rot, heart rot, wilt, stem cancer, stem rust, die-back, galls, leaf spots, leaf blight, powdery mildew and leaf rust diseases in forest trees; Protection against injuries by defoliating, sap sucking and mites, shoot, twig and root insects; seed and cone insects; wood boring insects and gall makers.

UNIT VII: FOREST UTILIZATION

Felling and felling tools; logging; timber depot; storage and transportation of timber; Physical and mechanical properties of wood; Defects and abnormalities of wood; Seasoning and preservation of wood; Non timber forest products such as gum, resin, tannin, essential oil, spices, bamboos and cane and medicinal plants; Important forest-based industries.

UNIT VIII: FOREST GENETICS

Introduction, scope of genetics and its application in the tree improvement; Heredity and variation; causes and kinds of variation in natural and artificial stands; forces that shapes variation; heritability and genetic gains; Weinburg Law; Provenience testing; Collection, processing, storage of seed; Seed dormancy, viability, pretreatment and seed testing; Progeny test and design; Methods of tree breeding; Type, establishment and management of seed orchards; Seed production areas; Clonal forestry; Vegetative propagation, role of growth substance in vegetative propagation and tissue culture.

UNIT IX: WILDLIFE ECOLOGY

Scope of wild life management in India, limitations of management, problems of wildlife manager; rare, threatened and endangered species of India; Food chain, quality and quantity, food web, carrying capacity, niches, food size, pinch period, predation and shelter, territory and home range of animal; Population biological surplus, environmental resistance, gregarious

and flocking, density and saturation point and population dynamics; Management and conservation of wildlife Sanctuaries, national parks, zoological parks and biosphere reserves: Techniques of wild life studies- census and estimates track and trails; Important animals of India, their distribution and importance; wild life values; wildlife and tourist; wild life as a land use.; Wild life protection act 1972 as amended 1991 and Zoogeographical regions of the world.

UNIT X: WATERSHED MANAGEMENT

Introduction and scope; natural hazards in watershed management; extent and causes of land denudation; aspects of hydrological cycle; deforestation and hydrologic change; impact of human activities on watershed; hill agriculture, erosion from mines and quarries, erosion hazards in road construction and scientific basis of watershed management; Role of forest in watershed management; Role of livestock in watershed management; Importance of the transfer of plant nutrients; Watershed management techniques; Wasteland their characteristics and reclamation.

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