

FARM FORESTRY
SARGUJA VISHWAVIDYALAYA, AMBIKAPUR



PROPOSED SYLLABUS FOR RESEARCH ENTRANCE TEST

IN

Ph.D. PROGRAMME

[W.E.F. 2018]

Department of Farm Forestry
University Teaching Department
Sarguja Vishwavidyalaya
Ambikapur-497001 (Chhattisgarh)

PROPOSED SCHEME OF EXAMINATION

Types of Questions	No. of Questions in section A and B	Marks
Objectives	30 (each 2 marks)	60
Subjective (50-100 words)	08 (each 5 marks)	40
Total Marks		100
Minimum Passing Marks		50
Time		3 Hours

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FARM FORESTRY Ph.D. ENTRANCE SYLLABUS

1. Silviculture and Silviculture Systems

Silvicultural Principles: ecological and physiological factors influencing vegetation, natural and artificial regeneration of forests: methods of propagation, grafting techniques; site factors; nursery and planting techniques-nursery beds, polybags and maintenance, water budgeting, grading and hardening of seedlings; special approaches; establishment and tending. Clear felling, uniform shelter wood selection, coppice and conversion systems. Management of silviculture systems of temperate, subtropical, humid tropical, dry tropical and coastal tropical forests with special reference to plantation silviculture, choice of species, establishment and management of standards, enrichment methods, technical constraints, intensive mechanized methods, aerial seeding thinning. Mangrove: habitat and characteristics, mangrove, plantation-establishment and rehabilitation of degraded mangrove formations; silvicultural systems for mangrove; protection of habitats against natural disasters. Cold desert - Characteristics, identification and management of species.

Traditional and recent advances in tropical silvicultural research and practices. Silviculture of some of the economically important species in India such as *Acacia catechu*, *Acacia nilotica*, *Acacia auriculiformis*, *Albizia lebbeck*, *Albizia procera*, *Anthocephalus cadamba*, *Anogeissus latifolia*, *Azadirachta indica*, *Bamboo spp*, *Butea monosperma*, *Cassia siamea*, *Casuarina equisetifolia*, *Cedrus deodara*, *Dalbergia sissoo*, *Dipterocarpus spp.*, *Embllica officindils*, *Eucalyptus spp*, *Gmelina arborea*, *Hardwickia binata*, *Largerstroemia lanceolata spp.*, *Pinus spp.*, *Populus spp*, *Pterocarpus marsupium*, *Prosopis juliflora*, *Santalum album*, *Semecarpus anacardium*, *Shorea robusta*, *Salmalia malabaricum*, *Tectona grandis*, *Terminalia species*, etc.

2. Agroforestry and Farm Forestry

Agroforestry - scope and necessity; role in the life of people and domestic animals and in integrated land use, planning especially related to (i) soil and water conservation; (ii) water recharge; (iii) nutrient availability to crops; (iv) nature and eco-system preservation including ecological balances through pest-predator relationships and (v) providing opportunities for enhancing bio-diversity, medicinal and other flora and fauna. Agro forestry systems under different agro-ecological zones; selection of species and role of multipurpose trees and NTFPs, techniques, food, fodder and fuel security. Interaction of crops, choice of species, regeneration of tree crops. Growth of tree crops, management of trees in Agroforestry systems, Economics of Agroforestry systems. D&D. Research and Extension needs. Social/Urban Forestry: objectives, scope and necessity; peoples participation. JFM - principles, objectives, methodology, scope, benefits and role of NGOs. Tribology - tribal scene in India; tribes, concept of races, principles of social grouping, stages of tribal economy, education, cultural tradition, customs, ethos and participation in forestry programmes. Traditional Agroforestry in Chhattisgarh.

3. Forest Ecology, Environment and Biodiversity Conservation

Forest ecology - Biotic and abiotic components, forest ecosystems; forest community concepts; vegetation concepts, ecological succession and climax, primary productivity, nutrient cycling and water relations; physiology in stress environments (drought, water logging salinity and alkalinity), Succession. Forest types in India, identification of species, composition and associations; dendrology, taxonomic classification, principles and establishment of herbaria and arboreta, Conservation of forest ecosystems. Clonal parks.

Environment; components and importance, principles of conservation, impact of deforestation; forest fires and various human activities like mining, construction and developmental projects, population growth on environment. Pollution - types, global warming, green house effects, ozone layer depletion, acid rain, impact and control measures, environmental monitoring; concept of sustainable development. Role of trees and forests in

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environmental conservation; control and prevention of air, water and noise pollution. Environmental policy and legislation in India. Environmental Impact Assessment. Economics assessment of watershed development vis-a-vis ecological and environmental protection. Biodiversity and its conservation: Hotspots of biodiversity, biodiversity of C.G. & India, Strategies for biodiversity conservation, National park and Sanctuaries in C.G. & India, gene pool, Endangered and Threatened Species.

4. Forest Soils and Watershed Management

Forests Soils, classification, factors affecting soil formation; physical, chemical and biological properties. Methods of soil survey and their utility; Preparation of soil survey map; Systems of soil classification in general and USDA classification system. Soil types of C.G. & India. Soil conservation - definition, causes for erosion; types - wind and water erosion; conservation and management of eroded soils/areas, wind breaks, shelter belts; sand dunes; reclamation of saline and alkaline soils, water logged and other waste lands. Role of forests in conserving soils. Maintenance and build-up of soil organic matter, provision of lopping for green leaf manuring; forest leaf litter and composting; Role of microorganisms in ameliorating soils; N and C cycles, VAM. Watershed Management - concepts of watershed; role of mini-forests and forest trees in overall resource management, forest hydrology, watershed development in respect of torrent control, river channel stabilization, avalanche and landslide controls, rehabilitation of degraded areas; hilly and mountain areas; watershed management and environmental functions of forests; water-harvesting and conservation; ground water recharge and watershed management; role of integrating forest trees, horticultural crops, field crops, grass and fodders.

5. Forest Tree Improvement and Seed Science

General concept of tree improvement, methods and techniques, variation and its use, provenance, seed source, exotics; quantitative aspects of forest tree improvement, seed production and seed orchards, progeny tests, use of tree improvement in natural forest and stand improvement, genetic testing programming, selection and breeding for resistance to diseases, insects, and adverse environment; the genetic base, forest genetic resources and gene conservation in situ and ex-situ. Cost benefit ratio, economic evaluation. Seed storage: Definition, importance classification and factors affecting the seed storage. Seed longevity and factors affecting seed longevity. Pre-storage treatment. Physiological change during aging. Viability and vigour. Storage of orthodox, recalcitrant and pre-storage of intermediate seeds. Fumigation and seed treatment, seed certification. Seed, seed formation, dispersal, stratification and seed dormancy. Selective breeding methods- mass, family, within family, family plus within family. Plus tree selection for wood quality, disease resistance and agroforestry objectives. Selection strategies and choice of breeding methods and progress in selective breeding in forest trees. Indirect selection for biotic and abiotic stresses.

6. Forest Management, Mensuration, Remote Sensing & Research Methodologies

Objective and principles; techniques; stand structure and dynamics, sustained yield relation; rotation, normal forest, growing stock; regulation of yield; management of forest plantations, commercial forests, forest cover monitoring. Approaches viz., (i) Site-specific planning, (ii) Strategic planning, (iii) Approval, sanction and expenditure, (iv) Monitoring (v) Reporting and Governance. Details of steps involved such as formation of Village Forest Committees, Joint Forest Participatory Management. Forest planning, evaluation and monitoring tools and approaches for integrated planning; multipurpose development of forest resources and forest industries development; working plans and working schemes, their role in nature conservation, bio-diversity and other dimensions; preparation and control. Divisional Working Plans, Annual Plan of Operations. Methods of measuring - diameter, girth, height and volume of trees; form-factor; volume estimation of stand, current annual increment; mean annual increment. Sampling methods and sample plots. Yield calculation; yield and stand tables, forest cover monitoring through remote sensing; Geographic

Information Systems for management and modelling. Research Methodology: Basic concept, Principals, steps, types etc. Statistical analysis. Forestry software & application. Basic computer application in forestry. Forest surveying - different methods of surveying, maps and map reading. Principles of remote sensing and its application in forestry, application of GIS in forest management. Basic principles of forest engineering. Building materials and construction. Roads and Bridges; General principles, objects, types, simple design and construction of timber bridges.

7. Forest Resources Utilization, Economics, Medicinal & Aromatic Plants

Environmentally sound forest harvesting practices: logging and extraction techniques and principles, transportation system, storage and sale; Non-Timber Forest Products (NTFPs) definition and scope; gums, resins, oleoresins, fibres, oil seeds nuts, rubber, canes, bamboos, medicinal plants, charcoal, lac and shellac, Katha and Bidi leaves, collection; processing and disposal. Need and importance of wood seasoning and preservation; general principles of seasoning, air and kiln seasoning, solar dehumidification, steam heated and electrical kilns. Composite wood: adhesives-manufacture, properties, uses, plywood manufacture-properties, uses, fibre boards-manufacture properties, uses; particle boards manufacture; properties uses. Present status of composite wood industry in India in future expansion plans. Pulp-paper and rayon: present position of supply of raw material to industry, wood substitution, utilization of plantation wood: problems and possibilities. Anatomical structure of wood, defects and abnormalities of wood, timber identification - general principles. Forest Resources of C.G. & conservation.

Forest economics and fundamental principles, cost-benefit analyses; estimation of demand and supply; analysis of trends in the national and international market and changes in production and consumption patterns; assessment and projection of market structures; role of private sector and co-operatives; role of corporate financing. Socio-economic analyses of forest productivity and attitudes; valuation of forest goods and service. Role of Ethnobotany in Indian Systems of Medicine; Ayurveda and Unani - Introduction, nomenclature, habitat, distribution and botanical features of medicinal and aromatic plants. Factors affecting action and toxicity of drug plants and their chemical constituents.

8. Forest Protection, Legislation and Wildlife Management

Injuries to forest - abiotic and biotic, destructive agencies, insect-pests and disease, effects of air pollution on forests and forest die back. Susceptibility of forests to damage, nature of damage, cause, prevention, protective measures and benefits due to chemical and biological control. General forest protection against fire, equipment and methods, controlled use of fire, economic and environmental costs; timber salvage operations after natural disasters. Role of afforestation and forest regeneration in absorption of CO₂. Rotational and controlled grazing, different methods of control against grazing and browsing animals; effect of wild animals on forest regeneration, human impacts; encroachment, poaching, grazing, live fencing, theft, shifting cultivation and control.

Legislation: History of forest development; Indian Forest Policy of 1894, 1952 and 1990. National Forest Policy 1988, Peoples involvement, Joint Forest Management, Involvement of women; Forestry Policies and issues related to land use, timber and non-timber products, sustainable forest management; industrialisation policies: institutional and structural changes. Decentralization and Forestry Public Administration. Forest laws, necessity; general principles, Indian Forest Act 1927; Forest Conservation Act, 1980; Wildlife Protection Act 1972 and their amendments; Application of Indian Penal Code to Forestry. Environmental Policy resolution, Air (Prevention and control of Pollution) Act, the water (Prevention and control Pollution) Act, 1974, the environmental (Protection) Act, 1986 and Rules 1986 Scheme of labeling of environment friendly product (Eco mark).
