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SYLLABUS FOR Ph.D. ENTRANCE EXAM 2023-24
PAPER-I
(RESEARCH METHODOLOGY)

- 1. Basic concept of research problem**
 - Rationale of research
 - Identification of research problem
 - Research objective
 - Types of research- fundamental/ applied/ action/ quantitative/ qualitative
- 2. Review of literatures**
 - Primary source
 - Secondary source
 - Searching e-resources, using research engines
 - Searching data base
 - Writing literature review
- 3. Methods of research**
 - Concept and formulation of hypothesis
 - Survey method
 - Experimental method (variable, designs)
 - Historical methods
 - Content analysis
- 4. Sampling of data**
 - Concept of sampling
 - Probability sampling techniques
 - Non Probability sampling techniques
 - Sampling error
- 5. Collection of data**
 - Primary data generation
 - Secondary data collection
 - Methods of data generation/ collection- by experiments, questionnaire, interview Schedule, focus groups etc.

6. Analysis of data

- Statistical analysis techniques
- Qualitative analysis techniques
- Application of computer in research data analysis

7. Reports preparation

- Structure and component of research report
- Organization of data
- Indexing of journal and research output
- Citation, references, bibliography
- Copyright, plagiarism, originality of research work

8. Research ethics

- Ethics in research
- National and International regulations/ laws/ ethics related to research on Human, Animals and Environments

Each question in both papers carries 1 mark and will have a total of 50 marks for each paper. The duration for solving each paper is 1 hour. Students must appear for both Paper-I and Paper-II as specified for the entrance. After completion and submission of Paper-I, the question paper Paper-II will be provided to the students. It is mandatory for the Student to appear in both Paper-I and Paper-II as specified for the entrance.

Scheme:

Paper-I Research Methodology

Number of questions – 50 MCQs covering whole syllabus

Maximum Marks – 50

Duration – 1 hr

Paper-II

Number of questions – 50 MCQs covering whole syllabus

Maximum Marks – 50

Duration – 1 hr

PAPER-II

(Forestry & Wildlife)

FOREST ECOLOGY AND INTRODUCTORY WILDLIFE

Forest Ecology: Definition Concept of ecosystem, structure and function of ecosystem, biotic and abiotic components, energy flow in the ecosystem, food chain, food web, trophic level.

Succession: Definition, course of succession, types of succession mechanism of succession of documentary succession, weed in succession, climax concept in succession, Biome.

Concept of community, attributes, physiognomy, species composition, species diversity, methods of sampling forest community. Community ecology: definition, characterization of community; composition, structure, origins and development of community, method of study of community, unit of vegetation classification. Population ecology, population characteristic, population growth, population interactions.

Definition of Wildlife, Important wildlife sanctuary & National park in India & Chhattisgarh. In-situ & Ex-situ conservation techniques of wildlife, Wildlife conservation projects- Tiger, Elephant, Lion and Crocodile.

Introduction to wildlife, forest & wildlife, important of wildlife & value of wildlife, status of wildlife in India. IUCN revised red list categories, Red Data Book and listing, wildlife census, radio telemetry in wildlife studies. Captive wildlife: Zoo and safari parks Captive breeding for conservation Central Zoo Authority of India.

WASTELAND AND WATERSHED MANAGEMENT

Wasteland- Definition, distribution in India, types of wastelands, wasteland development and management, selection of tree species for wasteland development, development through afforestation and reforestation.

Reclamation & restoration of problematic land- Mined area, degraded land, saline & alkaline land, waterlogged area, desert & other lands, industrial plantation

Definition and concept of watershed, definition of watershed management, factor influencing watershed, identification of watershed problems, objective of watershed management, planning for watershed development, development of vegetative barriers for soil and water conservation.

Wasteland and watershed management approaches: Biological approaches, community approaches. Mechanical engineering approaches, water harvesting techniques and recycling of rain water.

FOREST MENSURATION AND FOREST BIOMETRY

Definition & Introduction, object & scope of Forest Mensuration, Instrument & Methods use for measuring Tree diameter and girth, height, bark thickness, crown length & crown width, Tree form & Tree Factors.

Measurement of Volume of Felled & standing trees, Definition and type s of volume table, construction of volume table, stand table.

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Types of increment and its estimation, determination of age of trees, stump and stem analysis. Yield and stand table, stand structure and growing stock, yield regulation.

Forest Enumeration or inventory. Types of enumeration, factors effecting enumeration, sampling techniques, types of sampling. Fundamental concept of remote sensing, aerial photograph, satellite imageries for use in forest inventory.

TREE PROPAGATION AND IMPROVEMENT

Vegetative propagation: Definition, object in forestry, importance, advantages and limitation of vegetative propagation in forestry, propagation by cutting importance and advantages of stem cutting, root cutting treatment with growth regulators and fungicides, factor affecting regeneration of plants by layering

Tree Improvement: General principles of tree improvement, nature and extent of variation in natural population of tree species. Concept of seed stand and provenance test, selection and superior tree grading system.

Seed orchard establishment, seedling seed orchard and clonal seed orchard and progeny test, breeding methods, advanced generation breeding and hybridization, breeding for diseases and Insect resistance.

Tissue Culture: Historical resume and general techniques for plants tissue culture, culture media, maintenance of callus, batch and continuous cell suspension culture, Isolation and culture of protoplast fusion, cryopreservation.

ECONOMIC FORESTRY AND NWFP

FAMILIES OF FORESTRY IMPORTANCE: Distribution, floral characteristics and economic importance structure of the following families: Dipterocarpaceae, Malvaceae, Sterculiaceae, Meliaceae, Anacardiaceae, Combretaceae, Leguminosae.

FAMILIES of Forestry Importance: Bignoniaceae, Myrtaceae, Lythraceae, Rubiaceae, Verbenaceae, Lauraceae, Euphorbiaceae, Fabaceae, Ulmaceae, Moraceae, Palmaceae, Graminae, Coniferae.

Non-wood Forest Produce: Definition, classification, importance and present status in India and world, technologies and advancement for conserving resources. Sources of Minor forest products : lac, silk, gum & resin, food, paper, pulp, honey, flosses, fiber, dyes, tannin, medicines, edible colors, fruits, edible oils, essential oils, industrial oil, tendu leaves, katha and other minor forest produce.

Collection, storage and preservation of forest produce, processing and marketing of NWFP and implements used in collection and processing.

SILVICULTURE

Introduction: Definition and scope of silviculture. Objects of study of silviculture Relation of silviculture with forestry and its branches. Distinguishing features of trees: crown, stem, root, growth and development. Silviculture system: coppice system, selection system, clear felling system, regular and irregular system.

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Natural Regeneration: Definition and method of regeneration. Natural regeneration from seed: seed production, seed dispersal, seed germination and seedling establishment. Dying back of seedlings. Natural regeneration under clear felling, shelter wood and selection system. **Artificial regeneration:** Definition and objects, objects of reforestation, factor affecting regeneration, choice between artificial and natural regeneration. Objects of afforestation of different types of lands, denuded hill slopes, abandoned cultivated land, grasslands, drylands with or without irrigation, saline, alkaline and lateritic soils.

Nursery: Definition, importance and objet, classification, selection of sites, area fencing layout, preparation of beds, introduction of mycorrhiza, sowing of seed in beds, quantity of seeds, time of sowing, irrigation, weeding, transplanting, maintenance of fertility.

Factor of locality: Definition and classification, climatic factors, topographic factors, edaphic factors, biotic factors, improvement felling, pruning and climber control.

FOREST CLASSIFICATION AND WOOD TECHNOLOGY

The forests, classification of forest, growth of forest. Forest types: Definition, objects and bases of classification, system of classification, revised classification, brief description of groups, subgroups and types

Geographical and climatic (ecological) classification, Functional classification, Territorial classification, Administrative (Organizational) classification, Management (Silvicultural) classification, working circle, felling series: coupe, cuttings section, Periodic Block : Felling series in Selection forest. Felling series in Coppice-with-standard system.

Identification of wood. Scientific basis, finger print of wood, timber logging, wood seasoning, wood preservation, composite wood, improved wood. Implements used in collection and processing of forest products, purposes. Equipments and their uses, Keys for identification of timbers.

Wood technology: Development in wood science technology, formation of wood and bark in trees, meristematic tissues, permanent tissues, primary, secondary and anomalous growth. Gross feature of wood-pith, laburnum. Duramen. Early wood, late wood, compression wood, tension wood, annual rings double and multiple rings, cell types and their arrangement in softwood and hardwoods, trachieds, ray trachieds, parenchyma vessels fiber and inter-cellular canals resins, ducts of conifers.

FOREST PROTECTION

Importance of pathology, disease symptoms, nursery disease and heart rot disease, Disease management. Seed pathology: seed treatment seed certification.

Disease of important tree species: Teak, Sal, Sissoo, Khair, Neem, Bamboo, Eucalyptus, Terminalia, Gmelina and Casuarina. Physiological disorder and protection (fire, drought, frost, soil moisture, snow, wind).

Forest Entomology: Insect and pest responsible for damaging important plant species (Teak, Sissoo, Eucalyptus), insect pest of nursery, principles and methods of insect pest control and integrated pest management. Weed characteristics: Effect of weed and weed controlling measures, biological and artificial measures.

Fire Management: Causes of forest fire; Socio economic, natural and man-made causes (unintentional or accidental fire, fire due to collection of minor forest produce, fire due to logging operations, fire due to management reasons) Incendiary causes. Effects of fire, importance of fire prevention and fire prevention methods.

AGROFORESTRY AND FOREST MANAGEMENT

Agroforestry: definition, agroforestry systems, importance, benefits and limitations; components and significance of agroforestry: structural, functional, productive, protective, physiognomic, floristic, ecological, socio-economical: Farming system: monoculture and multiple cropping, agro and farm forestry. Components and their interaction in agroforestry: choice of species and management practice for live fencing hedgerow, alley cropping, windbreak, shelterbelt, hill slopes and terraces cultivation.

Agroforestry: Management of biotic and abiotic components for complimentary, supplementary, competitiveness and sustainability of systems. Tree crown, root architecture and their management for agroforestry system. Criteria for selection and screening of tree and agriculture systems. Designing and geometry of agroforestry systems, silvipastoral, systems. fodder tree species, grass, legume and pasture species. carrying capacity and grazing systems.

Forest Management: Definition and scope; Special objects and choice. Management of Private Forests vis-a-vis Public Forests, principles of Forest Management - Forest Policy of 1894, National Forest Policy – 1952 and 1988. Forest on concurrent list, Peculiar features of forestry enterprise. Social forestry: definition, objectives and social role of Forestry.

Rotation and Production Period: Introduction, Definition, Concept of Rotation in Regular and Irregular Forest. Type of Rotation, soil (Land) Expectation Value, Length of Rotation, Rotation of some Important Indian Species, choice of the type/ kind of Rotation, Rotation and conversion period. Yield regulation: Principles, objects and definition, type of yield-Intermediate and final, Silviculture systems in relation to yield, Methods or yield regulation in regular and irregular forests.

BIODIVERSITY AND CONSERVATION BIOLOGY

Definition of biodiversity, Biodiversity profile of India. Conservation of biodiversity in Indian scenario, future strategies for conservation of Indian biodiversity. Biodiversity conservation and its benefits. Concepts and levels of biodiversity: genetic diversity, species richness, ecosystem diversity. Biodiversity zones, biodiversity hot spots.

Concept of endangered, threatened and rare species. Pattern of losses; causes and factors of mass extinctions and critical hot spots extinctions, conservation of rare species, keystone species and mutualistic species, conservation movement in India.

Protected area of India and Chhattisgarh: Action plan for protecting biosphere reserves in India; biodiversity status versus development of high dam, power plants and mining activities, case studies, role of biotechnology in conservation of biodiversity.

Forest Genetic Resources- Types diversity, Ecosystem, Species & Genetic, Forests Resources, Medicinal Plants, NWFPs, Timber, Fodder & Fuel etc.

Vaibhava

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WILDLIFE MANAGEMENT

Wildlife health: basic concepts of disease and health condition. Measure disease of Indian wild mammals and birds. Epidemiology of disease. Disease and population dynamics. Disease transmission between domestic and wild population. Malnutrition, starvation, dehydration as syndromes. Management of wildlife health programme.

Population management: capture and handling of animals. Purpose, live traps, snares, pits, nets, spotlighting, animal barriers and its use; trenches, walls, mechanical fence, electric fence, replant. Drug immobilization: job stick, blowpipe, pistol, refuels cross bow, radio darts. Drug action: doses, responses, side effect, safety measures and complication. Handling and transport: sledge, crate and holding enclosure.

Individuals, location and identification: purpose, identification by natural markings and behavioral, idiosyncrasies. Passive marking: collars, tags, banding, rings etc. dynamics marking; beta light, radio tracking harness, telemetering of physiological parameters.

Basic principles of wildlife management and its need. Components of wildlife management; Tiger, Lion, Rhino, Wild buffalo, Black buck, Vultures, Hill Myna and Turtles. Indian Wildlife protection act 1972.

MEDICINAL AND AROMATIC PLANT

Ethnobiology: History of ethnobiology, Medicinal and aromatic plant spp., cultivation, processing and preservation: *Abelmoschus moschatus*, *Acorus calamus*, *Aloe vera*, *Acacia catechu*, *Asparagus racemosus*, *Azadirachta indica*, *Bacopa monnieri*, *Cassia angustifolia*, *Centella asiatica*, *Chlorophytum borivillianum*, *Curcuma aromatica*, *Cymbopogon citratus*, *C. flexuosus*, *C. martinii*, *Emblica officinalis*, *Mentha arvensis*, *Nardostachys jatamansi*, *Ocimum sanctum*, *Papaver somniferum*, *Pogostemon patchouli*, *Plantago ovata* and *Withania somnifera*.

Medicinal plants of Chhattisgarh, their distribution, sources and status. Drug sources: root, tubers, leaves, bark, stem, flower, fruit and seeds.

Conservation of medicinal plants: In-situ and ex-situ conservation. Edible plants: *Emblica officinalis*, *Eugenia jambolana*, *Eagle marmelos*, *Dyospyros melanoxylon*, *Dioscorea bulbifera*, *Buchnanian lanzan*, *Sterculia urens*, *Anogeissus latifolia* their cultivation practices and conservation.

Medicobotany and biochemistry of some medicinal plants used by the traditional healers of India. Bioactive compounds of *Catheranthus roseus*, *Rauwolfia serpentina*, *Andrographis paniculata*, *Gloriosa superba*, *Withania somnifera*, *Cannabis sativa*. Biopiracy in medicinal plants, Role of different institutions for promoting herbal medicines like NMPB, WHO, WWF, etc.

REMOTE SENSING AND GIS, AIR POLLUTION AND ENVIRONMENT IMPACT ASSESMENT

Remote Sensing: Basic of remote sensing and its application. Aerial photography and satellite imagery. Types of photography, optimum season for photography. Measurement on aerial photography, Height measurement- displace image, object shadows, trees and stand: tree crown diameter, crown closer or density, tree count, volume of individual trees, volume

of stands, land use classes recognize on aerial photographs, Forest type identification on aerial photographs.

Satellite Photography: Application of satellite photography, image interpretation. Digital analysis of imagery and application of GIS. Uses and values of GIS. Approaches to wildlife ecology and management.

Environmental Impact Assessment (EIA): Development of EIA as a management tool- Implications of land use change, guideline for EIA, environment, ecological restoration; criteria and indicators for sustainable forest management, feasibility and baseline studies.

Air Pollution: Definition, kinds of pollutants and their impacts. Assessment of environment in the world; Normal environmental standards for toxic/lethal substance/pollutants of physical, chemical and biological nature; Air pollution - abatement; Abiotic and biotic indicators of polluted and healthy environment.

Vinod Kumar

18/7/23

IMPORTANT NOTE

The entrance examination for Ph.D. Forestry & Wildlife will consist of Multiple Choice Questions (MCQs) covering various topics from the syllabus. There will be a total of 50 questions for each of the two papers. Paper-I will focus on Research Methodology, and Paper-II will cover Forestry & Wildlife subjects.

Each question in both papers carries 1 mark and will have a total of 50 marks for each paper. The duration for solving each paper is 1 hour. Students must appear for both Paper-I and Paper-II as specified for the entrance. After completion and submission of Paper-I, the question paper Paper-II will be provided to the students. It is mandatory for the Student to appear in both Paper-I and Paper-II as specified for the entrance.

Scheme:

Paper -I-Research Methodology

Number of questions - 50 MCQs covering whole syllabus

Maximum Marks - 50

Duration- 1 hr

Paper -II- Forestry

Number of questions - 50 MCQs covering whole syllabus

Maximum Marks - 50

Duration- 1 hr

 