FORESTRY

Revised Pre-PhD course work (One semester)

(Effective from Academic Session 2020)

The course work shall consist of the following:

1. Core Course
2. Elective Course

Core course shall be mandatory for all students and the total number of credit for the core and elective courses shall be 15 with the following pattern.

Code	Title of the paper	Credits (Marks)			
		Theory (External + Sessional)	Term paper	Practical	Total
CORE COURSE					
SOA/F/C561	Research Methodology & Publication Ethics	3 (60+20)	-	1(20)	4 (100)
SOA/F/C562	Forestry in context of climate change	2 (60+20)	-	1(20)	3 (100)
Elective Course					
SOA/F/E571	Cultivation of commercially important medicinal & aromatic plants	3 (60+20)	-	1(20)	4 (100)
SOA/F/E572	Ecotourism: Concept and approaches	3 (60+20)	-	1(20)	4 (100)
SOA/F/E573	Modern Nursery Production	3 (60+20)	-	1(20)	4 (100)
SOA/F/E574	Application of Remote sensing and GIS	3 (60+20)	-	1(20)	4 (100)
SOA/F/E575	Microbial Biotechnology in forestry	3 (60+20)	-	1(20)	4 (100)

Note: The two core courses are compulsory and out of five elective, students must select any two depending on the availability of faculty.

Course contents for Pre-Ph. D Programme in Forestry
Core Courses

SOA/F/C/561: Research Methodology & Publication Ethics 4(3+1)

Part: A: Research Methodology

Research Design and Data Collection: Research methodology- definition, different types of research design. Basic principles of experimental designs. Sampling design- sample survey, steps in sample design, criteria of selecting a sampling procedure and different types of sample designs. Methods of Data Collection: Primary and secondary data.

Processing and Analysis of Data: Processing operations, elements/types of analysis, statistics in research, measures of central tendency, dispersion, asymmetry, relationships. Correlation and regression.

Testing of Hypotheses: Basic concepts of testing of hypothesis, procedures for hypothesis testing. Hypothesis testing for different assumption of variables/parameters.

Analysis of Variance and Covariance: Basic principles of one-way ANOVA, two-way ANOVA and ANCOVA). Multivariate analysis techniques (Characteristics and applications, classification of Multivariate analysis, important multivariate techniques, important method of factor analysis).

Part: B: Publication Ethics

Philosophy and Ethics: Introduction to Philosophy: definition, nature and scope, concept, branches. Ethics: definition, moral philosophy, nature of moral judgements and reactions.

Scientific Conduct : Ethics with respect to science and research. Intellectual honesty and research integrity. Scientific misconducts: Falsification, Fabrication and Plagiarism (FFP). Redundant publications: duplicate and overlapping publications, salami slicing.Selective reporting and misrepresentation of data.

Publication Ethics: Publication ethics: definition, introduction and importance. Best practices / standards setting initiatives and guidelines: COPE, WAME, etc. Conflicts of interest. Publication misconduct: definition, concept, problems that lead to unethical behaviour and vice -versa, types. Violation of publication ethics, authorship and contributorship.Identification of publication misconduct, complaints and appeals. Predatory publishers and journals.

Practicals:

Part A: Research Methodology: Designing of field experiment and their analysis.

Part B:

Open Access Publishing: Open access publications and initiatives.SHERPA/ RoMEO online resource to check publisher copyright & self- archiving policies. Software tool to identify predatory publications developed by SPPU. Journal finder journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggester, etc

Publication Misconduct : Group Discussions. Subject specific ethical issues, FFP, authorship. Conflicts of interest. Complaints and appeals: examples and fraud from India and abroad

Software tools : Use of plagiarism software like Turnitin, Urkund and other open source software tools

Databases and Research Metrics:

Databases : Indexing databases.Citation databases: Web of Science, Scopus, etc.

Research Metrics : Impact Factor of journal as per Journal Citation Report, SNIP, SJR, IPP, Cite Score. Metrics: h- index, g index, i10 index, altmetrics

SOA/F/C 562: Forestry in context of climate change* 3(2+1)

Forestry and its importance for sustainable development in India. Site quality evaluation. Growth of stands.. Concept of Regeneration. Reproduction methods and their implication in silviculture

Types, causes, risk of extinction, Conservation, disturbance and restoration , Community dynamics of qualitative and quantative of phytodiversity

Watershed management and environmental functions of forests; water-harvesting and conservation,

Tree outside forest, trends in agroforestry system research and development, opportunities and challenges in current research in agroforestry, measurements and estimation of carbon sequestration in agroforestry system, climate change and adaptation, mitigation through forestry, national agroforestry policy 2014.

Important diseases and insect pest of plantation and standing trees and their control and management, role of mycorrhizae in tree health.

Practical: According to topics requirements.

Note: * The course shall be taught in the context of global warming & predicted climate change.

Optional Courses
(Select any two of the following)

SOA/F/E571: Cultivation of Commercially Important Medicinal and Aromatic Plants (2+1)

Importance and need of cultivation of medicinal and aromatic plants. Origin, distribution, morphological features, climatic and soil requirements, propagation and nursery techniques, transplanting and care after, nutritional and water requirements, plant protection, harvesting and post harvesting processing, active constituents and uses of important medicinal plants. *Picrorhiza kurrooa, Saussurea costus, Aconitum heterophyllum, Podophyllum hexandrum, Swertia chirayita, Valeriana jatamansi, Viola serpens, Asparagus racemosus, Chlorophytum borivilianum, , Stevia rebaudiana, Aloe vera, Echninacea spp., Withania somnifera, Solanum nigrum, Cassia angustifolia, Andrographis paniculata, Pelargonium graveolens, Rosa domacena, Tagetes munua, Matricaria chamomilla* or any other species specific to the region. Crop geometry and crop management (seasonal, biennial and perennial crops), Organic cultivation of medicinal and aromatic herbs. Good agriculture practices (GAP) in medicinal plants. Precision farming.

Publication Misconduct : Group Discussions. Subject specific ethical issues, FFP, authorship. Conflicts of interest. Complaints and appeals: examples and fraud from India and abroad

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Practical: Preparation and layout of nursery and field beds/plots. Methods of seed sowing. Preparation of shoot and root cuttings. Transplantation of seedling and rooted cuttings, irrigation techniques. Hoeing and weeding, weed identification and their control. Harvesting, cleaning, drying and grading of crop produce. Demonstration of different storage methods. Essential oil distillation. Raising and harvesting of at least one crop grown in the area.

SOA/F/E 572: Ecotourism- Concepts and Approaches **(2+1)**

Eco tourism- study of history of tourism , various forms of tourism and evolution of ecotourism. Understanding dimensions of tourism and essential conditions for tourism to occur. Differences between tourism components. Mass tourism versus ecotourism. Organized tours and free independent travelers. World Tourism Organizations. Problems with definition of ecotourism and criticism. Understanding dimensions of ecotourism and the criteria of quality for ecotourism. Quebec declaration. Different forms of ecotourism like hard and soft ecotourism. Ecotourism indicators and conceptual differences between developing and development countries. International organizations and NGOs promoting ecotourism. Sociological implication of ecotourism.

Practicals: Students should make detailed reference of the various forms of ecotourism in the world. Visit to various ecotourism areas and identification of the ecotourism components, suggest modifications. Students should also undertake some exercise on the blending of local cultural and sociological heritage with the various forms of ecotourism.

SOA/F/E 573: Modern Nursery Production **(2+1)**

Introduction and importance of nursery. Types of nursery- bare root, containerized and vegetatively produced nursery. Bare root nursery- nursery soil and water management, bed preparation, pre sowing seed treatments, seed sowing and intermediate operation viz. pricking, watering, fertilization, weeding and hoeing. Plant physiology and nursery environment interaction affecting seedling growth. Root culturing techniques. Lifting, grading, packing and storing for out planting. Containerized nursery- type and size of container including root trainers, selection of growth medium. Types of greenhouses and mist propagation. Vegetative propagation- selection of superior phenotype. Method of propagating viz. cutting, budding, grafting and layering. Factors affecting rooting of cuttings.

Practical: Introduction and identification of modern equipments and tools used in nursery. Seed quality testing- viability and germination. Pre-sowing seed treatments. Preparation of nursery beds and growing media for containerized nursery. Sowing of seed and other intermediate nursery management operations. Preparation and planting of cuttings. Use of vegetative propagation methods such as budding, grafting and layering. Maintenance of nursery records. Identification of nursery insects and diseases and their control measures. Visit to nurseries.

SOA/F/E 574: Application of remote sensing and geographic Information system (GIS) **(2+1)**

Basic concepts of Remote sensing and Geographic Information System (GIS). Determination of geomorphologic, physiological, vegetation, soil, land use permeates of

a watershed. Spatial and non-spatial data analysis. Preparation of thematic layers and their digitization.

Practical: Thematic layer build up, over laying and their integration using ERDAS and ARCINFO software package. Interpretation of satellite data and digital image processing. Preparation of thematic maps.

SOA/F/E 575: Microbial Biotechnology in Forestry (3+1)

Plant Growth Promoting Rhizobacteria (PGPR): Use and application of Pseudomonas, Bacillus and Streptomyces in soil fertility and other functions.
Actinomycetes: Non legume symbiosis and its application in forestry.
Mycorrhiza: Studies about mycorrhizal symbiosis in higher plants. Types of mycorrhiza. Application of endomycorrhizal symbiosis in afforestation.

Practical: Isolation and identification of A Mycorrhizal spores from rhizosphere of the plants. Percent root colonization of AMycorrhizal fungi in plants. Inoculum production of AMycorrhizal fungal spores and use of inoculum in nursery establishment.