DEPARTMENT OF FORESTRY, WILDLIFE & ENVIRONMENTAL SCIENCES
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)

Course: M.Sc. in Forestry and Environmental Sciences

Syllabus Objectives and Outcome

SEMESTER-I

PAPER I. SILVICULTURE

Objective: To provide knowledge about Forest ecosystem concept, stand dynamics forest succession, productivity and vegetation forms and regeneration of forest.

Outcome: The course enables the students to know the components and dynamics of forest or different forest types.

PAPERII. FOREST BIOMETRY, SURVEYING & ENGINEERING

Objective: To develop understanding of students about tree measurements, forest inventory, forest survey and yield concepts.

Outcome: To enable the students to record the biometric measurement of tree and survey of theentire forest area.

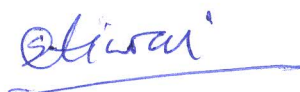### PAPER III: FOREST MANAGEMENT, REMOTE SENSING & GIS

Objective: To provide knowledge to students about forest management and use of Remote Sensing and GIS technique.

Outcome: The course enable the students to be well-worse in forest management with latest techniques of Remote Sensing & GIS technique.

Paper IV. FOREST ECOLOGY AND BIODIVERSITY CONSERVATION

Objective: To develop understanding of students about ecological aspects of forest resource and biodiversity conservation.

Outcome: The course enables the students to understand the entire ecosystem of the forest with the special emphasis on the occurring biodiversity.

PAPER V. FOREST PROTECTION

Objective: To provide knowledge to students about forest protection through diseases &pest management.

Outcome: Enables the students to maintain or to develop the healthy growth of the tree with the protection from pest and other damaging agents of forest.

PAPER VI.FOREST STASTISTICS& RESEARCH METHODOLOGY

Objective: To provide exposure about methods of statistical analysis, design and sampling techniques.

Outcome: Make the students well worse in the statistical approach to assess the forest area.

SEMESTER-II

PAPER I. FOREST POLICY, LAWS AND ENVIRONMENTAL LEGISLATION

Objective: To develop understanding of students about forest policy, laws and Environmental Legislation.

Outcome: Enables the students to be able to manage the forest with the legal aspects.

PAPER II. FOREST TREE IMPROVEMENT AND BIOTECHNOLOGY

Objective: To acquaint the students about general principles of tree breeding with examples ofimportant trees.

Outcome: Enables the students to develop the improved progeny of the forest trees.

PAPER III. WOOD TECHNOLOGY AND NANO FORESTRY

Objective: To acquaint with the physical characteristics and strength properties of wood.

Outcome: the course enables the students to deal the forest as a timber industry and wood as a major product of forest.

PAPER IV. WILDLIFE BIOLOGY AND CONSERVATION

Objective: To give the understanding and conservation of wildlife in forest area.

Outcome: Wildlife plays an important role in balancing the environment. After having the knowledge about wildlife, students will spread the massage among society for conservation and protection of wildlife. Its purpose is to promote the conservation of living resources important to human being.

PAPER V. FOREST SOILS AND WATERSHED MANAGEMENT

Objective: The basic objective of the course is to expose the students about the soil properties of world forests, its production function and capability of storing carbon in forest soils and opportunity challenges in the management of forest soils. Apart from this students will exposed about the watershed management project improving the forest health.

Outcome: The student will acquire sound knowledge on world forest soil and its role in carbon storage and CO2 greenhouse gas mitigation. This will also enable students to have training for implementation of watershed projects.

PAPER VI. FOREST PRODUCTS AND INDUSTRIES

Objective: To provide knowledge about natural products of forest and based industries on these products.

Outcome: The course will equip the students regarding wood based industries. How it is affecting the economy of the country such as match and splint, sports and pencil making, besides this wood extracts resins and gums, katha, tannis and various type of non-timber products. Practical will make them aware regarding extracting method of different products of wood.

PAPER VII: ENVIRONMENT AND GLOBAL CLIMATIC CHANGES

Objective: To develop understanding of students about environment, global climatic changes and their effect on forest aquatic ecosystems.

Outcome: Enables the student about the regional, global environment and occurring climate change.

SEMESTER- III

SPECIALIZATION COURSES

Following two specialization courses will be offered to the students and students have to select only one specialization courses during the semester.

      A. FOREST GENETIC RESOURCES
      B. FOREST MANAGEMENT

A. FOREST GENETIC RESOURCES

PAPER I. BREEDING METHODS IN FOREST TREES

Objective: To acquaint the students about the concepts of sub- selection, population structure for breeding and production, genetic testing and making designs.

Outcome: The student can enable the knowledge about the selection of superior trees, disease resistant, drought resistant for breeding purposes and to produce the quality planting material. It can be helpful for the higher biomass production. Genetic testing may also help to get superior plant material for future in forestry.

PAPER II. FOREST TREES REPRODUCTIVE BIOLOGY AND SEED ORCHARDS

Objective: To impart the knowledge of reproduction in forest tree species and to understand the mechanism of breeding, sex expression, and seed orchard development.

Outcome: Students can enable the reproductive biology of the tree species and seed orchard can also helpful for the production of genetically improved seed for large scale afforestation programme.

PAPER III. MOLECULAR GENETICS OF FOREST TREES

Objective: To impart the knowledge of DNA and genomic structure of forest trees.

Outcome: Better quality and higher productivity are the main achievement through natural selection. The use of molecular marker has greatly enhanced our understanding of genomic structure of forest trees.

PAPER IV: QUANTITATIVE GENETICS OF FOREST TREES

Objective: Todevelop vision of students in the qualitative analysis of genetic & phenotypic characteristics. It is an applied part of tree breeding and tree improvement.

Outcome: Student will enable the estimation of similarity and dissimilarity in the tree population and give the suitability of individuals in the environment. They will also be able to understand the fitness of individual, relation with ancestry and genetic variance which can help in tree improvement and tree breeding techniques.

PAPER V: FOREST GENETIC DIVERSITY, CONSERVATION & ENVIRONMENTAL IMPACT

Objective: To provide the student knowledge about the genetic diversity in forest tree species, their distribution, assess and analysis, law and methodology of *in-situ* and *ex-situ* conservation.

Outcome: Students will enable to know the genetic diversity and conversation methods of different forest tree species and impact of environmental conditions on it.

SEMESTER- IV

This semester will have following training programmes.

1. **Field Training (Attachment with State Forest Department for analysis of FGR & its distribution)**
   Specialization: Forest Genetic Resources (FGR)

   Learn to make FGR Inventory. Analysis of Provenance Variation. Identification of self and cross pollinating forest trees and its genetic diversity pattern analysis. Genetic diversity status on the basis of morphological markers. Population wise conservation priority zones of specific forest tree species.. Species wise adaptability in the natural forest stands. Identification of plus tree and elite tree zones in forest. Flowering and seeding pattern of forest. Seed dispersal pattern and its influence on forest genetic resources. Identification of species wise seed production areas. Clone, seed, pollen and specimen collection. Identifying the factors which are threat to forest genetic diversity. Characterization of Genetic Potential against changing climate. Forest regeneration

status. Making plans for longterm and short term tree improvement programmes. Development of practical step guide to the in-situ conservation of FGR. Forest genetic resource management by forest department.

2. Industrial Training

Study the nature structure of Industrial Training and Business Organization: Raw material procurement and processing; Production, Marketing and Economics at Wood workshop and saw mills/wood seasoning and preservation treatment units/Pulp and Paper Industries/ Katha making industry/ Resin, Turpentine, Gums, Tendupatta, Chironji Industry; Herbal Pharmacies and other wood product industries.

3. Computational skills.

Introduction to computers and personal computers. basic concepts (H/W, S/W, Input & Output Devices) operating system(Introduction of open source and closed source), DOS and Windows XP/7/8, introduction of programming languages, BASIC languages concepts basic and programming techniques, MS Office. Win Word, Excel, Power Point, MS Access. Introduction of Statistical & Remote sensing softwares. Introduction to Multi-Media and its application. Introduction to Internet.

4. Student Report

B. FOREST MANAGEMENT

PAPER I. FOREST RESOURCE ANALYSIS

Objective: To develop understanding of students about the nature and importance of forest resources, their availability and management strategies.

Outcome: To be well worse in the management of the forest resources and to develop strategies for their improved production with the analytical approach.

PAPER II.PRODUCTION MANAGEMENT IN NURSERY AND PLANTATION FORESTRY

Objective: To develop understanding and management skills of the students in respect of commercial nursery production and plantation forestry.

Outcome: Enable the skills to manage the forestry product with commercial approach.

PAPER III. FINANCE AND MARKETING MANAGEMENT OF FOREST RESOURCES

Objective: To develop understanding of students about financial and marketing management toolsasapplied in forest resources.

Outcome: Enable the students in financial and marketing management of forest.

PAPER IV. TREE BUSINESS MANAGEMENT

Objective: To develop understanding and management skills of the student with special reference to tree farm business management.

Outcome: Enables the students to manage the tree business.

PAPER V. FOREST MANAGEMENT FOR ENVIRONMENT CONSERVATION

Objective: To develop understanding and management skills of the student with special reference to Environment conservation.

Outcome: Enables the students to manage the forest area with the emphasis on environmental conservation.

SEMESTER- IV

This semester will have following training programmes.

1. **Field Training (Attachment with State Forest Department for analysis of Forest Management patterns & Management techniques)**
   Specialization: Forest management

   Visit to modern forest nurseries, herbal gardens and watersheds. To study the medicinal and aromatic plants diversity, their conservation and domestication. Study the felling and logging operations, timber lots and industrially important products. Introduction to Working Plan, data generation-enumeration and volume/yield calculation. Writing of compartment history files. Study the catchment area treatment plant and FDA. Study the Regeneration and Management of regionally important forestry tree species. Laying out sample plots, stump analysis, preparation of local volume table and use of forestry field equipments/ instruments. Visit to National Parks, Sanctuaries and Bio-sphere reserves. Visit to ecologically degraded areas around cement plants, mined areas etc and study

rehabilitation measures adopted. Visit to plantation site and data collection for its growth pattern and feasibility.

2. **Industrial Training**

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4. Student Project