# BANKURA UNIVERSITY

(West Bengal Act XIX of 2013- Bankura University Act, 2013)

Main Campus, Bankura Block-II, P.O.: Purandarpur, Dist.: Bankura, Pin- 722155, West Bengal

**Office of the Secretary**

**Faculty Council for Undergraduate Studies**


Ref: BKU/FCUG/205/2024 Date: 26/07/2024

## NOTIFICATION

As directed, the undersigned is pleased to inform all concerned that Bankura University has initiated the process to implement New Curriculum and Credit Framework for Undergraduate Programme, UGC 2022 (as per NEP 2020) for 4-years Undergraduate programme with Forestry as Major, Minor etc. from the academic session 2023-2024. The Syllabus for the purpose will be framed and finalized as per the guidelines of appropriate authority. As an important corollary to the process, the workshop will be organized on the date mentioned herewith to get the feedback from the stakeholders. Present Students, Alumni, Guardians, Academicians and other stakeholders related to the specific programme/course are requested for their kind participation in the workshop and to present their views/ observations etc. The stakeholders may go through the draft syllabus attached herewith and convey their observations to the office of the undersigned, ugsecretaryoffice@bankurauniv.ac.in within seven days from the date of publication of notice.

T.A. will not be provided for the purpose.

Date: 28th July, 2024.

Time: 12 noon onwards

Google Meet joining info

Video call link: https://meet.google.com/hvv-oaba-jab

Sd/-
Dr. Arindam Chakraborty
Secretary
Faculty Council for Undergraduate Studies

# Draft NEP Syllabus Structure

**FOR**

**FOUR YEAR UNDER-GRADUATE COURSE**

**IN**

## FORESTRY (HONOURS)

**w.e.f. - (2024-2025)**

## BANKURA UNIVERSITY

BANKURA, WEST BENGAL

PIN- 722155

# Course Structure- 2024-25

## Semester-Wise courses in Four Years B.Sc.(Honours) in Forestry

### (Total 164 Credit)

### Semester I (20 Credit Hours)

| Sl.No. | CourseCode | Course | Sem. End Marks | Internal Marks | Practical Marks | Total Marks | Credit (T+P) |
|---|---|---|---|---|---|---|---|
| 1. | S/FST/101/MJC-1 | Introduction to Forestry and Agroforestry | 25 | 10 | 15 | 50 | 3+1 |
| 2. | S/FST/102/MN-1 | Introduction to Forestry (For students of other discipline) | 25 | 10 | 15 | 50 | 3+1 |
| 3. | S/FST/103/MD-1 | Apiculture (For students of other discipline) | 25 | 10 | 15 | 50 | 2+1 |
| 4. | S/FST/104/SEC-1 | Tree Seed, Nursery and Plantation Management | 25 | 10 | 15 | 50 | 2+1 |
| 5. | ACS/105/AEC-1 | Compulsory English: Literature and Communication | 40 | 10 | - | 50 | 2+0 |
| 6. | ACS/106/VAC-1 | Environmental Studies | 40 | 10 | - | 50 | 4+0 |
| | | **TOTAL** | 180 | 60 | 60 | 300 | 20 |

## Semester II (20 Credit Hours)

| Sl.No. | CourseCode | Course | Sem. EndMarks | InternalMarks | PracticalMarks | TotalMarks | Credit |
|---|---|---|---|---|---|---|---|
| 1. | S/FST/201/MJC-2 | Silviculture | 25 | 10 | 15 | 50 | 3+1 |
| 2. | S/FST/202/MN-2 | Theory and Practice of Silviculture (For students of other discipline) | 25 | 10 | 15 | 50 | 3+1 |
| 3. | S/FST/203/MD-2 | Seed technology and Nursery Management (For students of other discipline) | 25 | 10 | 15 | 50 | 2+1 |
| 4. | S/FST/204/SEC-2 | Forest Soil, Nutrient and Degraded Land Management | 25 | 10 | 15 | 50 | 2+1 |
| 5. | ACS/205/AEC-2 | MIL-1 (Santali, Sanskrit and Bengali) | 40 | 10 | NA | 50 | 2+0 |
| 6. | ACS/106/VAC-2 | Any one of the following :<br>A: Health and Wellness<br>B: Understanding India:<br>Indian PhilosophicalTraditions and Value Systems<br>C: Basics of Indian Constitution<br>D: Arts and Crafts of Bengal<br>E:Historical Tourism in West Bengal | 40 | 10 | NA | 50 | 4+0 |
| | | **TOTAL** | 210 | 60 | 30 | 300 | 20 |
| **Summer Internship (Compulsory for 1 Year Certificate course)** | ACS/107/INT-1 | | | | | | 4 |

**Summer Internship (Compulsory for 1 Year Certificate course)**

## Semester III (20 Credit Hours)

| Sl.No. | CourseCode | Course | Sem. EndMarks | InternalMarks | PracticalMarks | TotalMarks | Credit |
|---|---|---|---|---|---|---|---|
| 1. | S/FST/301/MJC-3 | | 25 | 10 | 15 | 50 | 3+1 |
| 2. | S/FST/302/MJC-4 | | 25 | 10 | 15 | 50 | 3+1 |
| 3. | S/FST/303/MN-3 | | 25 | 10 | 15 | 50 | 3+1 |
| 4. | S/FST/304/MD-3 | | 40 | 10 | NA | 50 | 3+0 |
| 5. | S/FST/305/SEC-3 | | 40 | 10 | NA | 50 | 3+0 |
| 6. | ACS/306/AEC-3 | | 40 | 10 | NA | 50 | 2+0 |
| | | **TOTAL** | 195 | 60 | 45 | 300 | 20 |

## Semester IV (22 Credit Hours)

| Sl.No. | CourseCode | Course | Sem. EndMarks | InternalMarks | PracticalMarks | TotalMarks | Credit |
|---|---|---|---|---|---|---|---|
| 1. | S/FST/401/MJC-5 | | 25 | 10 | 15 | 50 | 3+1 |
| 2. | S/FST/402/MJC-6 | | 25 | 10 | 15 | 50 | 3+1 |
| 3. | S/FST/403/MJC-7 | | 25 | 10 | 15 | 50 | 3+1 |
| 4. | S/FST/404/MJC-8 | | 25 | 10 | 15 | 50 | 3+1 |
| 5. | S/FST/405/MN-4 | | 25 | 10 | 15 | 50 | 3+1 |
| 6. | ACS/406/AEC-4 | | 40 | 10 | NA | 50 | 2+0 |
| | | **TOTAL** | 165 | 60 | 75 | 300 | 22 |
| **Summer Internship (Compulsory for 2 Year Diploma course)** | ACS/407/INT-2 | **10 Weeks** | | | | | 4 |

## Semester V (22 Credit Hours)

| Sl.No. | CourseCode | Course | Sem. EndMarks | InternalMarks | PracticalMarks | TotalMarks | Credit |
|---|---|---|---|---|---|---|---|
| 1. | S/FST/501/MJC-9 | | 25 | 10 | 15 | 50 | 3+1 |
| 2. | S/FST/502/MJC-10 | | 25 | 10 | 15 | 50 | 3+1 |
| 3. | S/FST/503/MJC-11 | | 25 | 10 | 15 | 50 | 3+1 |
| 4. | S/FST/504/MJC-12 | | 25 | 10 | 15 | 50 | 3+1 |
| 5. | S/FST/505/MN-5 | | 25 | 10 | 15 | 50 | 3+1 |
| 6. | ACS/506/INT-3 | Internship | NA | NA | 50 | 50 | 0+2 |
| 7. | S/FST/507/ST | Study Tour | NA | NA | 50 | 50 | 0+2* |
| | | **TOTAL** | 125 | 50 | 125 | 300 | 22 |

***Study Tour= Non-Credit Course**

## Semester VI (20 Credit Hours)

| Sl.No. | CourseCode | Course | Sem. EndMarks | InternalMarks | PracticalMarks | TotalMarks | Credit |
|---|---|---|---|---|---|---|---|
| 1. | S/FST/601/MJC-13 | | 25 | 10 | 15 | 50 | 3+1 |
| 2. | S/FST/602/MJC-14 | | 25 | 10 | 15 | 50 | 3+1 |
| 3. | S/FST/603/MJC-15 | | 25 | 10 | 15 | 50 | 3+1 |
| 4. | S/FST/604/MJC-16 | | 25 | 10 | 15 | 50 | 3+1 |
| 5. | S/FST/605/MN-6 | | 25 | 10 | 15 | 50 | 3+1 |
| | | **TOTAL** | 125 | 50 | 75 | 250 | 20 |

## Semester VII (20 Credit Hours)

| Sl.No. | CourseCode | Course | Sem. | InternalMarks | PracticalMarks | TotalMark | Credit |
|---|---|---|---|---|---|---|---|

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | **EndMarks** | | | **s** | |
| 1. | S/FST/701/MJC-17 | | 25 | 10 | 15 | 50 | 3+1 |
| 2. | S/FST/702/MJC-18 | | 25 | 10 | 15 | 50 | 3+1 |
| 3. | S/FST/703/MJC-19 | | 25 | 10 | 15 | 50 | 3+1 |
| 4. | S/FST/704/MJC-20 | | 25 | 10 | 15 | 50 | 3+1 |
| 5. | S/FST/705/MN-7 | | 25 | 10 | 15 | 50 | 3+1 |
| | | **TOTAL** | 125 | 50 | 75 | 250 | 20 |

## Semester VIII (20 Credit Hours)

### UG Honours

| **Sl.No.** | **CourseCode** | **Course** | **Sem. EndMarks** | **InternalMarks** | **PracticalMarks** | **TotalMarks** | **Credit** |
|---|---|---|---|---|---|---|---|
| 1. | S/FST/801/MJC-21 | | 25 | 10 | 15 | 50 | 3+1 |
| 2. | S/FST/802/MJC-22 | | 25 | 10 | 15 | 50 | 3+1 |
| 3. | S/FST/803/MJC-23 | | 25 | 10 | 15 | 50 | 3+1 |
| 4. | S/FST/804/MJC-24 | | 25 | 10 | 15 | 50 | 3+1 |
| 5. | S/FST/805/MN-8 | | 25 | 10 | 15 | 50 | 3+1 |
| | | **TOTAL** | 125 | 50 | 75 | 250 | 20 |

## Semester VIII (20 Credit Hours)

### (4 Year Honours with Research)**

| **Sl.No.** | **CourseCode** | **Course** | **Sem. EndMarks** | **InternalMarks** | **PracticalMarks** | **TotalMarks** | **Credit** |
|---|---|---|---|---|---|---|---|
| 1. | S/FST/801/MJC-21<br>S/FST/802/MJC- | | 25 | 10 | 15 | 50 | 3+1 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 22 S/FST/803/MJC-23 S/FST/804/MJC-24 | | | | | | |
| 2. | S/FST/805/MN-8 | | 25 | 10 | 15 | 50 | 3+1 |
| 3. | S/FST/806/RPD-1 | | NA | NA | 50 | 50 | 0+12 |
| | | **TOTAL** | 50 | 20 | 80 | 150 | 20 |

**Honours with Research Students Will Opt Any One Course from Available Four (4) Courses in Major in VIII Semester

| | | |
|---|---|---|
| UG Honours<br>Total Credit | MJC=24x4=96<br>MN=8x4=32<br>MD=3x3=9<br>SEC=3x3=9<br>AEC=4x2=8<br>VAC=2x4=8<br>INT=1x2=2 | 164 |
| 4 Year Honours with Research<br>Total Credit | MJC=21x4=84<br>MN=8x4=32<br>MD=3x3=9<br>SEC=3x3=9<br>AEC=4x2=8<br>VAC=2x4=8<br>INT=1x2=2<br>RPD=1x12=12 | 164 |

## Examination:

| Question pattern: End-Semester Examination | | | | |
|---|---|---|---|---|
| Sl.No | Questions to be answered | Out of | Marks of each question | Total Marks |
| **For 40 Marks** | | | | |
| 1 | 05 | 10 | 1 | 5×1 = 5 |
| 2 | 05 | 10 | 2 | 5×2 = 10 |
| 3 | 05 | 10 | 5 | 5×5 = 25 |
| | | | | |
| **For 25 Marks** | | | | |
| 1 | 5 | 08 | 1 | 5×1 = 5 |
| 2 | 5 | 08 | 2 | 5×2 = 10 |
| 3 | 2 | 05 | 5 | 2×5 = 10 |

**Practical Exam Marks Pattern for Credit Course**

**For 15 Marks**

| Exam/ Hand Practice/ Laboratory work/Field Work/ Experiment etc. | Note Book/ Record | Viva-Voce | Total |
|---|---|---|---|
| 5 | 5 | 5 | 15 |

**For 50 Marks**

| Internship/Project or Dissertation planning and Report writing/ Study Tour Report etc. | Regularity | Presentation | Viva-Voce | Total |
|---|---|---|---|---|
| 20 | 10 | 15 | 5 | 50 |

**Practical Exam Marks Pattern for Non Credit Course**

**For 50 Marks**

| Field work/Regular activities/Attendance | Performance | Behavior | Viva Voce | Total |
|---|---|---|---|---|
| 25 | 10 | 5 | 10 | 50 |

**#Total marks may be reduced or increased in each subject**

# Semester I (20 Credit Hours)

| Sl.No. | CourseCode | Course | Sem. End Marks | Internal Marks | Practical Marks | Total Marks | Credit (T+P) |
|---|---|---|---|---|---|---|---|
| 1. | S/FST/101/MJC-1 | Introduction to Forestry and Agroforestry | 25 | 10 | 15 | 50 | 3+1 |
| 2. | S/FST/102/MN-1 | Introduction to Forestry (For students of other discipline) | 25 | 10 | 15 | 50 | 3+1 |
| 3. | S/FST/103/MD-1 | Apiculture (For students of other discipline) | 25 | 10 | 15 | 50 | 2+1 |
| 4. | S/FST/104/SEC-1 | Tree Seed, Nursery and Plantation Management | 25 | 10 | 15 | 50 | 2+1 |
| 5. | ACS/105/AEC-1 | Compulsory English: Literature and Communication | 40 | 10 | - | 50 | 2+0 |
| 6. | ACS/106/VAC-1 | Environmental Studies | 40 | 10 | - | 50 | 4+0 |
| | | **TOTAL** | 180 | 60 | 60 | 300 | 20 |

## 1. S/FST/101/MJC-1: Introduction to Forestry and Agroforestry (3+1)

| | |
|---|---|
| **Objective** | To gain knowledge about India's & world's forest type and their vegetation.<br>To learn about the different types of agroforestry system.<br>To learn about various practices of agroforestry in different agro-climatic zone of India and wasteland reclamation.<br>To learn about the financial and socio economic analysis of Agroforestry.<br>The contribution of forest industry, other forest-based enterprises and forest ecosystem services to social, economic and environmental development, among others, is significantly increased. |

| Theory | Topic | Lectures |
|---|---|---|
| **Unit I** | Forests and Forestry-definitions, role, benefits - direct and indirect. History of Forestry - divisions and interrelationships. Forest type of India.Classification of forests- High forests, coppice forests, virgin forest and second growth forests, pure and mixed forests-even and un-even aged stands. (Classification of forests on different basis- Age-, Origin, Composition, Legal, Management, Growing Stock etc.).Introduction to world forests - geographical distribution and their classification, factors influencing global forests distribution - productivity and increment of world forests. National and international organizations in forestry. | **15** |
| **Unit II** | Definition and scope of Agroforestry. Social, ecological, and economic benefit of agroforestry. History of agroforestry. Components of Agroforestry- Provisioning and regulator services of agroforestry. Classification of agroforestry systems. Major | **15** |

| | | |
|---|---|---|
| | Agroforestry practices in different agro-ecological zones of India. | |
| **Unit III** | Tree-crop interaction in agroforestry – Definition, kind of interaction – Positive & Negative interactions, Aboveground & belowground interactions- Manipulation of density, space, crown and roots. | **10** |
| **Unit IV** | Agroforestry practices for wasteland reclamation. Non-wood forest products based agroforestry – Soil fertility improvement and water conservation through agroforestry. Socio-economic analysis of various agroforestry systems. National Agroforestry Policy 2014. National and International organizations in Agroforestry. | **10** |
| **Practical** | Field visit in different forest sites. Identification of tree species and their local and botanical name. Introduction about instruments used in forestry. Study the desirable characteristics of trees/shrubs/grasses for various agroforestry pogrammes. Assessment of standing stock of tree species in various agroforestry systems. Survey of agroforestry practices in local/adjoining areas. Field observations to characterize the structural, functional and economic attributes of the following agroforestry systems and practices-agroforestry. Exercise on Diagnosis and Design of agroforestry systems and practices. Assessment of productivity of tree crop combinations. Studying resource partitioning in agroforestry systems - water, light and nutrients. | |

| | |
|---|---|
| **Outcome** | Knowledge about various types of forests and its vegetation of India's and world.<br>Knowledge of agroforestry and its importance in today scenario.<br>Knowledge of agroforestry and its classification.<br>Knowledge of new research methodology of agroforestry. |

## 2. S/FST/102/MN-1: Introduction to Forestry(3+1)

## (For students of other discipline)

| | |
|---|---|
| **Objective** | To gain knowledge about India's & world forest and their vegetation.<br>To learn about the classification and types of forest.<br>To learn about different tool and technique used in tree and stand measurements.<br>To learn about the financial and socio economic analysis of Agroforestry. |

| Theory | Topic | Lectures |
|---|---|---|
| **Unit I** | Introduction and definition of forestry; Forest and plantation; Concept of forestry education; Brief history of forestry; Branches of forestry; Legal classification of forests: Reserved forest, ~~protected~~ Protected forest, ~~un~~Un-class~~ified~~ forest, village forest and community forest (van panchayat). | **15** |
| **Unit II** | Forest area and forest cover in the state, country and world; Category of forest on the basis of origin: Primary forest and secondary forest; Forest acts and policies; Importance of forests for community, environment, climate change and sustainable development. | **10** |

| | | |
|---|---|---|
| **Unit III** | Introduction and definitions of forest mensuration; Principles of tree measurement: Height, diameter, circumference, basal area and volume; Measuring instruments in forestry: Christian's hypsometer, tree calliper, Ravi multimeter, Abney's level, Haga altimeter, meter tape, wedge prism, weighing machine and Pressler's increment borer. | **15** |
| **Unit IV** | Basic principles of forest management; Introduction, definition and scope of forest management; Participatory forest management and joint forest management (JFM). | **10** |
| **Practical** | Field visit in different forest sites. Identification of tree species and their local and botanical name. Introduction about instruments used in forestry (Christian's Hypsometer, tree calliper, Ravi multimeter, Abney's level, Haga altimeter, meter tape, wedge prism, weighing machine, Pressler's increment borer, soil pH meter, soil thermometer, Swedish bark gauge, seed germinator, oven, balance etc.).Measurement of tree height, diameter, basal area, circumference. Nursery development, preparation of nursery layout, nursery beds, uses of different container, planting material seeds and vegetative parts, raising of plants of different tree species. | |

| | |
|---|---|
| **Outcome** | The student will gain knowledge about the various concepts and developments in the field of Forestry.<br>Knowledge about various types of forests and its vegetation of India's and world.<br>Improving food security and livelihoods<br>Integrating forests and other land uses.<br>The students will gain knowledge on tree measurements for assessing the outturn of individual as well as group of trees. |

## 3. S/FST/103/MD-1: Apiculture (2+1) (For students of other discipline)

| | |
|---|---|
| **Objective** | Acquiring knowledge of bee biology<br>Practical skills in hive management and honey production,<br>Understanding the role of bees in pollination,<br>Learning safety protocols,<br>Exploring business opportunities through beekeeping |

| **Theory** | **Topic** | **Lectures** |
|---|---|---|
| **Unit I** | History of bee keeping, Species diversity of honey bees, Pollination support through beekeeping -Role of honeybees in ecosystem, Domestication of Indian bees and Italian bees, Bee hives and peculiarities, Capturing of bee colonies, Bee keeping equipment's. | **10** |
| **Unit II** | Biology and social life of honey bees: Morphology and identification of Queen, drones and worker bees, cast system in honey bees-family and cast, division of labor, bee dance and communication in bees, Honey Bee biology-emerging of queen, swarming, mating, egg laying, life span, Collection of pollen by bees, morphological modifications - modified legs, extraction of pollen, Royal jelly and hormonal influence, Bee wax, wax glands, Nesting pattern of bees, Bee sting, bee venom, venom gland, Architectural design of bee hives, types of cells. | **15** |
| **Unit III** | Basic operational principles of bee colonies: Selection of location, Up keeping of bee colonies, Off seasonal management of bee colonies, Growth period management, | **15** |

| | | |
|---|---|---|
| | Honey flow-seasonal management, Diseases and parasites of honey bees-control measures. | |
| **Unit IV** | Honey and its ingredients: Composition of honey, conversion of nectar to honey, Medical value of honey, special properties and uses of honey, processing and value, addition of honey, Bee wax and uses, extraction, purification, processing and value addition of bee wax, Bee pollen and bee venom - uses. | **5** |
| **Unit V** | Marketing aspects of bee products, Role of Govt and Non-Govt agencies in promoting apiculture in West Bengal, Present status and future scope of apiculture as a small scale industry in West Bengal, Present scenario and Scope of apiculture in India. | **5** |
| **Practical** | Identification of different casts in honeybees-Queen, drones and workers, Structure of honey comb-different type of cells for queen, drones and workers, Morphological peculiarities of worker bees-Honey and pollen storage structures, Familiarize bee keeping instruments and bee hives, Familiarization with bee enemies and diseases and their control, Handling of bee colonies and manipulation for honey production. | |

| | |
|---|---|
| **Outcome** | Attain practical skill in keeping the bee hive and maintain bee colonies<br>Understand the composition and applications of bee products<br>Describe the market value of bee products<br>Identify various products from honey bees<br>Understand the biology, morphology, species composition and social life of honey bees |

## 4. S/FST/104/SEC-1 Tree Seed, Nursery and Plantation Management (2+1)

| | |
|---|---|
| **Objective** | Enhanced ~~technician~~ technical knowledge and skills in tree seed and seedling management will help to reduce risks in tree planting schemes.<br>Aspects of tree seed biology; morphology of fruit, development and maturation of seed, longevity and dormancy.<br>The student will learn Nursery management as an important tool for the success of such entrepreneurships and will help nurserymen to run profitable businesses~~.(Artificial plantation).~~<br>The subject will provides guidelines for nursery establishment and describes species specific propagation techniques, pest, disease, weed, water and nutrient management and economics.<br>To gain intensive knowledge of silvicultural practices for different forest plantations for obtaining higher utilizable biomass |

| Theory | Topic | Lectures |
|---|---|---|
| **Unit I** | Importance of seed in present day forestry, seed and fruit development, seed dispersal. Planning of seed collection- Methods of seed collection. Seed processing- - cleaning, drying and grading. | **10** |
| **Unit II** | Seed storage- Storage methods- Storage containers. Seed dormancy concept-types of dormancy, treatments for breaking exogenous and endogenous dormancy. Seed testing-definition-ISTA rules. Sampling- seed weight-moisture-authenticity-seed health. Germination testing-Germination evaluation- Indirect tests of viability. Seed Act and Seed Certification. | **10** |
| **Unit III** | Introduction and scope of Forest nursery. Nursery establishment - site selection – | **5** |

| | | |
|---|---|---|
| | planning, and layout of nursery area. Types of forest nursery, types of nursery beds, preparation of beds, fumigation. Methods of seed sowing. Plant Propagation Techniques. Study of important nursery pest sand diseases and their control measures. | |
| **Unit IV** | Brief idea of containerized nursery technique -advantages, disadvantages- type and size of containers. ~~root~~ Root deformations- container designs and types/root trainers and rooting media. Planting bare-root seedlings: advantages, disadvantages. Methods for field handling and planting bare-rootstock. Merits and demerits of containerized nursery. Nursery practices for some important tree species.Target seedling concept. | **10** |
| **Unit V** | Plantations-definition and scope. History of plantations, Development of plantation forestry, Plantation organization and structure, Land and plantation development. Plantation planning- National and regional planning-project appraisal and project implementation– feasibility studies. Plantation silviculture - Choice of species- Plantation establishment- Plantation maintenance- Nutrition in plantations- use of fertilizers- Major pest and disease in plantations- sanitation and control measures. Plantation records- plantation journal. | **10** |
| **Unit VI** | Industrial plantations- paper and pulp wood- match wood, plywood plantations- Plantations yielding NTFPs- Energy plantation- high density short rotation plantations- petro crops- avenue plantations- Plantations as potential carbon sinks carbon sinks- Economic factors in plantation development- social and cultural considerations. | **5** |
| **Practical** | Identification of tree seeds; Seed maturity tests; Physical purity analysis; Determination of seed moisture; Seed germination test; Hydrogen peroxide test; Tetrazolium test for viability; Seed vigour and its measurements; Methods of breaking dormancy in tree seeds; Testing membrane permeability; Study of seed collection and equipments; Seed extraction; Visit to seed production area and seed orchard; Visit to seed processing unit/testing laboratory; Study of seed sampling equipments. Preparation of production and planning schedule for bare root and containerized nurseries. Nursery site and bed preparation. Pre-sowing treatments. Sowing methods of small, medium, and large sized seeds. Pricking and transplanting of in transplant beds. Intermediate nursery management operations. Preparation of ingredient mixture. Filling of containers. Visit to tree nurseries. Study the tools and materials for plantation establishment- Visit small and large plantations- study their management and functioning- Exposure to plantation project preparation- economic evaluation and feasibility studies of plantation projects. | |

| | |
|---|---|
| **Outcome** | Student will gain knowledge on seed production, collection, processing and storage.<br>Information will be departed on managing nursery operations based on seed propagation, and the main objective is to obtain good germination and provide optimum conditions for their survival and growth into strong healthy trees.<br>To gain knowledge of propagation techniques<br>Students acquire hands on knowledge on the plantation techniques for important forestry operations and plantation techniques. |

**5. ACS/105/AEC-1: Compulsory English: Literature and Communication (2+0)**

**Syllabus from University pool**

**6. ACS/106/VAC-1: Environmental Studies (4+0)**

**Syllabus from University pool**

# Semester II (20 Credit Hours)

| Sl.No. | CourseCode | Course | Sem. End Marks | Internal Marks | Practical Marks | Total Marks | Credit |
|---|---|---|---|---|---|---|---|
| 1. | S/FST/201/MJC-2 | Silviculture | 25 | 10 | 15 | 50 | 3+1 |
| 2. | S/FST/202/MN-2 | Theory and Practice of Silviculture (For students of other discipline) | 25 | 10 | 15 | 50 | 3+1 |
| 3. | S/FST/203/MD-2 | Seed technology and Nursery Management (For students of other discipline) | 25 | 10 | 15 | 50 | 2+1 |
| 4. | S/FST/204/SEC-2 | Forest Soil, Nutrient and Degraded Land Management | 25 | 10 | 15 | 50 | 2+1 |
| 5. | ACS/205/AEC-2 | MIL-1 (Santali, Sanskrit and Bengali) | 40 | 10 | NA | 50 | 2+0 |
| 6. | ACS/106/VAC-2 | Any one of the following :<br>A: Health and Wellness<br>B: Understanding India: Indian Philosophical Traditions and Value Systems<br>C: Basics of Indian Constitution<br>D: Arts and Crafts of Bengal<br>E:Historical Tourism in West Bengal | 40 | 10 | NA | 50 | 4+0 |
| | | **TOTAL** | 210 | 60 | 30 | 300 | 20 |
| **Summer Internship (Compulsory for 1 Year Certificate course)** | ACS/107/INT-1 | | | | | | 4 |

## 1. S/FST/201/MJC-2: Silviculture (3+1)

| | |
|---|---|
| **Objective** | To develop basic understanding on forest and factors influencing forest growth and development.<br>To impart knowledge on tending operations followed in forest with preliminary information on succession in forest<br>To study the factors effecting the growth and establishment of forest.<br>To learn about natural and artificial regeneration.<br>To impart knowledge on tending operations<br>To learn how to production superior quality timber. |

| Theory | Topic | Lectures |
|---|---|---|
| **Unit I** | Silviculture- objectives and scope-relation with other branches of Forestry Silvics. | **5** |
| **Unit II** | Site factors - climatic, edaphic, physiographic, biotic and their interactions. Trees and their distinguishing features, growth and development. Root growth- fine root/functional root production- Direct and indirect benefits- biophysical interactions- trees and buffering functions- C sequestration potential of forests. | **10** |
| **Unit III** | Silvicultural systems-definition, scope and classification. Systems of concentrated regeneration- systems of diffused regeneration- accessory systems- Clear felling systems- Shelter wood system - Selection system and its modifications- Coppice systems- copies with standard Culm selection system in Bamboo, Canopy lifting system in Andaman. Silvicultural systems followed in other countries. | **10** |
| **Unit IV** | Regeneration of forests – objectives - ecology of regeneration- natural and artificial regeneration. Natural regeneration-seed production, seed dispersal, germination and establishment, requirement for natural regeneration, advance growth, coppice, and root sucker, regeneration survey, natural regeneration supplemented by artificial regeneration. | **10** |
| **Unit V** | Artificial regeneration - object of artificial regeneration - advantages. Factors governing the choice of regeneration techniques. Tree planting- Sowing v/s planting different kinds of pits- tending and cultural operations- weeding- kinds of weeding- release operations- singling, cleaning–liberation cutting. | **5** |
| **Unit VI** | Origin, distribution, general description, phenology, silvicultural characters, regeneration methods, stand management practices pest and diseases and economic importance of the some Broad leaved, Conifers, Fast growing andMPTs of India. | **10** |
| **Practical** | Acquaintance with modern silvicultural tools. Visits to different forest areas/types. Study of forest composition. Field preparation- marking, alignmentandstacking,pitmaking-planting,varioustendingoperations-weeding,cleaning, singling, pruning, pollarding, lopping, and thinning- fertilization in trees-plant protection and sanitation measures. Study the morphological description and field identification characteristics of trees, seeds and seedlings. Study the silviculture of trees in response to light, fire, drought, frost, root suckering, coppicing and pollarding, etc. Visit various problems areas and study on species suitability. Visit forest plantations and other woodlots. Study the planting density and stand management regimes for various end uses such as timber, pulpwood, plywood, cottage industries etc. | |

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| **Outcome** | The student will gain knowledge on basic of forestry and factors influencing forest growth and development with practical training on tending operations in forest.<br>The students also gain practical and field knowledge on regeneration of forest and raising plantation with proper information on different silvicultural systems followed in Indian forest.<br>The students would acquire basic knowledge on Silviculture and silviculture system of some broad leaved and conifer tree species of India<br>Knowledge about the silviculture characters of species<br>Knowledge about the artificial and natural regeneration of species<br>Knowledge about the economic importance of species |

## 2. S/FST/202/MN-2: Theory and Practice of Silviculture (3+1)

**(For students of other discipline)**

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| **Objective** | To study the art and science of forest trees.<br>To study the various types of forest, and their classification.<br>To study the factors effecting the growth and establishment of forest.<br>To learn about natural and artificial regeneration.<br>To learn about increase production or higher volume per unit area.<br>To learn about production technique of superior quality timber.<br>To learn about exotics species. |

| Theory | Topic | Lectures |
|---|---|---|
| **Unit I** | Definitions: Forests and Forestry- Silviculture objectives and scope of silviculture-relation with other branches of Forestry Silvics. Site factors - climatic, edaphic, physiographic, biotic and their interactions. | **10** |
| **Unit II** | Trees and their distinguishing features, growth and development. Root growth- fine root/functional root production- Direct and indirect benefits- biophysical interactions- trees and buffering functions- C sequestration potential of forests. Silvicultural systems-definition, scope and classification. Systems of concentrated regeneration- systems of diffused regeneration- accessory systems- Clear felling systems- Shelter wood system - Selection system and its modifications- Coppice systems- copies with standard Culm selection system in Bamboo, Canopy lifting system in Andaman. Silvicultural systems followed in other countries. | **15** |
| **Unit III** | Regeneration of forests – objectives - ecology of regeneration- natural, and artificial regeneration. Natural regeneration-seed production, seed dispersal, | **15** |

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| | germination and establishment, requirement for natural regeneration, advance growth, coppice, and root sucker, regeneration survey, natural regeneration supplemented by artificial regeneration. | |
| **Unit IV** | Artificial regeneration - object of artificial regeneration - advantages. Factors governing the choice of regeneration techniques. Tree planting- Sowing v/s planting different kinds of pits- tending and cultural operations- weeding- kinds of weeding- release operations- singling, cleaning–liberation cutting. | **10** |
| **Practical** | Acquaintance with modern silvicultural tools. Visits to different forest areas/types. Study of forest composition.<br>Field preparation- marking, alignmentandstacking,pitmaking-planting,varioustendingoperations-weeding,cleaning, singling, pruning, pollarding, lopping, and thinning- fertilization in trees-plant protection and sanitation measures.<br>Study the morphological description and field identification characteristics of trees, seeds and seedlings. Study the silviculture of trees in response to light, fire, drought, frost, root suckering, coppicing and pollarding,etc. | |

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| **Outcome** | The student will gain knowledge on basic of forestry and factors influencing forest growth and development with practical training on tending operations in forest.<br>The students also gain practical and field knowledge on regeneration of forest and raising plantation with proper information on different silvicultural systems followed in Indian forest. |

## 3. S/FST/203/MD-2: Seed technology and Nursery Management (2+1)

## (For students of other discipline)

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| **Objective** | To impart knowledge on production, collection, processing, quality control and storage of tree seeds and its application in production and conservation of forests.<br>To impart knowledge on nursery preparation and management. |

| Theory | Topic | Lectures |
|---|---|---|
| **Unit I** | Importance of seed in present day forestry, seed and fruit development, seed dispersal. Planning seed collection-Collection of immature fruits - Methods of seed collection. Fruit and seed handling-maintainingviability and identity-special precautions for recalcitrant seeds. Seed processing- operations prior to extraction-pre-cleaning, methods of extraction- operations after extraction-cleaning, grading and control of moisture level- factors affecting drying of orthodoxseeds.Seedstorage-definition-purpose,recalcitrantseeds-Harrington's rule of thumb, seed maturity-parental and annual effects.Storage condition and ageing of seeds.Storage methods- Storage containers. | **15** |
| **Unit II** | Seed dormancy- types of dormancy, treatments for breaking exogenous | **10** |

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| | andendogenousdormancy.Seeddressingandpelleting.Seedtesting-definition-ISTArules.Sampling- seed weight-moisture-authenticity-seed health. Germination testing-germination_equipment-conditions_for_selected_species. Germinatione__valuation-germination__testing in__nursery. Indirect tests of viability. Seed Act and Seed Certification. | |
| **Unit III** | Introduction and scope of_Forest nursery. Nursery establishment - site selection – planning, and layout of nursery area. Types of_forest nursery, types of nursery beds, preparation of beds, fumigation. Methods of seed sowing and_mulching, seedling growth and development, pricking, weeding, hoeing, rotation, organic matter_supplements and cover crops, mycorrhizae, fertilization, shading, pruning, root culturing techniques,_lifting windows, grading, packaging. Storing and transportation. | **15** |
| **Unit IV** | Containerized nursery technique -advantages, disadvantages- root deformations- container designs and types/root trainers and_rooting media. Methods for field handling and planting bare-rootstock. Containerized nursery technique- Type and size of___containers.___Merits and demerits ofcontainerizednursery.Roottrainertechniques-Preparationofingredientmixture.Studyofimportantnurserypestsanddiseasesandtheircontrolmeasures.Nurserypracticesforsomeimportanttreespecies.Targetseedlingconcept. | **10** |
| **Practical** | Identificationofseedsoftreespecies;Seedmaturitytests;Physicalpurityanalysis;Determination of seed moisture; Seed germination test; Hydrogen peroxide test; Tetrazolium test for_viability; Seed vigour and its measurements; Methods of breaking dormancy in tree seeds; Testing_membrane permeability; Study of seed collection and equipments; Planning of seed collection;_Seed collection; Seed extraction; Visit to seed production area and seed orchard; Visit to seed processing unit/testing laboratory; Study of seed sampling equipments. Preparation of production_and planning schedule for bare root and containerized nurseries. Nursery site and bed preparation._Pre-sowing treatments. Sowing methods of small, medium, and large sized seeds. Mother beds and_transplant bed preparation- Pricking and transplanting of in transplant beds. Intermediate nursery_management operations. Preparation of ingredient mixture. Filling of containers.Visittotreenurseries. | |

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| **Outcome** | Student will gain knowledge on seed production, collection, processing and its importance for tree and forest.<br>Students would acquire adequate knowledge and skill on production of nursery and clonal seedlings in trees. They will also gain knowledge on commercial tree nursery and clonal production.<br>Goal of seed technology is to increase agricultural production through spread of good quality seed of high yielding varieties developed by the plant breeders. |

## 4.S/FST/204/SEC-2: Forest Soil, Nutrient and Degraded Land Management (2+1)

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| **Objective** | Learn the fundamental principles of the chemistry and physics of soil.<br>To impart knowledge about the Geology, rocks and soil formation.<br>Learn the essentiality of nutrients in soil, their status and availability.<br>Learn soil organic matter transformation and the dynamics of N and P pools in soil.<br>To develop skills on tacking different problem soils with suitable vegetation |

| Theory | Topic | Lectures |
|---|---|---|
| **Unit I** | Pedology –rocks types - soil forming. Weathering of rocks and minerals -weathering factors. Factors of soil formation. Soil forming processes. Physical and chemical properties of Soil. Elementary knowledge of soil classification – soil orders. | **10** |
| **Unit II** | Forest soils- characteristics- distinguishing features- changes in physical and chemical properties compared to agricultural soils. Introduction to Soil Science - its significance, composition of earth's crust, soil as a natural body - major components by volume. | **10** |
| **Unit III** | Essential nutrient elements-occurrence, availability and their functions. Diagnosis of nutrient deficiencies-visual symptoms, soil fertility evaluation methods. Site productivity and nutrient cycling in forest soils. Bio-fertilizers – their importance. Nitrogen fixation. Nitrification and de-nitrification in forest ecosystems. Mycorrhizae: types, biology and importance with specific relevance to tree crops and mobilization of phosphorus and micro-nutrients. Organic matter decomposition - Factors affecting organic matter decomposition – Stages of organic matter decomposition - C: N ratio of organic matter, its importance and nutrient availability. | **10** |
| **Unit IV** | Degraded lands: Concept, classification, status, extent and causes of degraded lands/wastelands, different types of degraded lands– physical, chemical and biological and degradation. Land degradation Neutrality – need and ways of achieving. Soilerosion-types,causes and mechanism, measures to control erosion, ravine and sand-dune formation and their control measures. Salt affected soils-classes of salt affected soils, causes, extent and their effects on plant growth and afforestation / reclamation practices. Acid soils- definition, characteristics, causes and afforestation. Water logged areas- explanation, impact on pant growth and Biodrainage techniques. | **10** |
| **Unit V** | Afforestation and reclamation of denuded hill slopes, landslips and landslides, avalanche and cold desert, mined out, dry, rocky and Murray areas. Desertification-definition,impact and causes,preventionandcountermeasures (shelter belts and windbreaks). Soilpollution- types, effects and control measures through forestry techniques. National and state levelprogrammesondegradedlands/wastelanddevelopment.RoleofGovernmentagencies and NGO's in degraded lands/wasteland development programme. | **10** |
| **Practical** | Identification of rocks and minerals; Study of soil profile; Collection and preparation of soil samples; Soil analyses- Physicochemical parameters like moisture, colour, bulk density, organic matter, pH, EC; Textural analysis, available N, P, K, Ca, Mg,S and | |

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| | micronutrients etc. and interpretation of their results. Identification and study of various degraded lands. Visit to nearby degraded lands (eroded site, ravine and sand dune, coastal area, waterlogged area, denuded hill slopes, land slips and landslides, avalanche and cold desert, mined out, dry, rocky and Murray areas)and afforestation programme. | |

**5.ACS/205/AEC-2: Drawn from University Pool (2+0)**

**6. ACS/106/VAC-2: Drawn from University Pool (2+0)**

**ACS/107/INT-1: Summer Internship (Compulsory for 1 Year Certificate course) (0+4)**

| Practical | Topic | |
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| | The students will have an internship or training for 10 weeks'. The internship should be preferably arranged outside of the parent institution at any assigned organisation, industry, research institution, project, or with a progressive farmer, agribusiness, etc.<br><br>After the completion of their internship, the students will have to submit a report of their learning's and also present it in the form of a seminar before nominated faculty members and other students.<br><br>The assessment will be based on the report or assessment received from the industry or organisation, the report, and the presentation made at the university or college. Ideally, the weight age will be 50% for both internal and external. | |