THE ASSAM
ROYAL GLOBAL UNIVERSITY
GUWAHATI

Royal School of Life Sciences (RSLSC)

Department Of Forestry

Course Structure & Syllabus
(Based on NEP-2020)

M.Sc. Forestry
(2-year Course)

W.E.F.
AY-2025-26

STRUCTURE OF THE SYLLABUS FOR 2 YEAR PG PROGRAMME

SCHOOL NAME -RSLSC
DEPARTMENT NAME -FORESTRY
PROGRAMME NAME -M.Sc. FORESTRY

1st SEMESTER				
COURSE CODE	**COURSE TITLE**	**LEVEL**	**CREDIT**	**L-T-P**
FOR144C101	Forest Ecology and Biodiversity Conservation	400	4	4-0-0
FOR144C102	Principles of Silviculture	400	4	4-0-0
FOR144C103	Forest Resources and Economics	400	4	4-0-0
FOR144C104	Forest Biometry	400	4	4-0-0
FOR144C115	Practical I-Forest Ecology and Environmental Assessment	400	4	0-0-8
FOR144C116	Practical II- Forest Management, Silviculture, and Tree Measurement	400	4	0-0-8
*MOOCs	*MOOCs/online course will be identified by the dept. from the list of courses available on the MOOC online platform/SYAWAM portal	400	4	
		TOTAL CREDIT FOR 1st SEMESTER	**28**	
2nd SEMESTER				
COURSE CODE	**COURSE TITLE**	**LEVEL**	**CREDIT**	**L-T-P**
FOR144C201	Silviculture II	500	4	4-0-0
FOR144C202	Climate Change and Forestry	500	4	4-0-0
FOR144C203	Seed and Nursery Technology	500	4	4-0-0
FOR144C204	Forest Management	500	4	4-0-0
FOR144C205	Forest Certification	500	4	4-0-0
*MOOCs	*MOOCs/online course will be identified by the dept. from the list of courses available on the MOOC online platform/SYAWAM portal	500	4	4-0-0
		TOTAL CREDIT FOR 2nd SEMESTER	**24**	
TOTAL CREDIT FOR 1st YEAR = 52				
For students with 3rd and 4th Semester Coursework + Research 3rd SEMESTER				
COURSE CODE	**COURSE TITLE**	**LEVEL**	**CREDIT**	**L-T-P**
FOR144C301	Forest Systematics and Ethnobiology	500	3	3-0-0
FOR144C302	Agroforestry Principles and Systems	500	3	3-0-0
FOR144C313	Practical III-Practical Techniques in Biodiversity and Climate Change Assessment	500	3	0-0-6
FOR144C314	Practical IV-Agroforestry Systems and Sustainable Land Management	500	3	0-0-6
	Dissertation (students with research in 3rd Sem) (Minor Project)	500	8	0-0-0
		TOTAL CREDIT FOR 3rd SEMESTER	**20**	
4th SEMESTER				
COURSE CODE	**COURSE TITLE**	**LEVEL**	**CREDIT**	**L-T-P**
	Dissertation (students with research in 4th Sem) (Major Project)	500	12	0-0-0
FOR144C401	Forest Policy and Law	500	4	4-0-0
FOR144C402	Remote Sensing and Geographic Information System	500	2	2-0-0
FOR144C412	Remote Sensing and Geographic Information System Practical	500	2	0-0-4
	TOTAL CREDIT FOR 4th SEMESTER		**20**	
TOTAL CREDIT FOR 2nd YEAR = 40				

M. Sc. Forestry in Forestry: Semester-I

Paper-I Core	Forest Ecology and Biodiversity Conservation L-T-P-C:4-0-0-4 Credit Unit: 4 Evaluation Scheme: T	Course Code FOR144C101

Course Objective: To provide students with the principles of forest ecology, biodiversity conservation, and strategies for sustainable management of forest genetic resources.

Course Outcomes:

On successful completion of the course, the students will able to:		Bloom's cognitive level
CO1	Understand the concepts of forest ecology, forest productivity, and nutrient cycling in forest ecosystems.	2
CO2	Apply appropriate methods for assessing forest community structure, biodiversity indices, and regeneration status.	3
CO3	Analyze global and national strategies for biodiversity conservation and the role of conservation laws and acts.	4

Detailed Syllabus:

Modules	Title of Unit and Contents	Hours
I	Introduction to forest ecology: Concept of forest ecology, forest ecosystem, significance of forest and its resources; Forest productivity (primary and secondary productivity), Measurement of forest productivity; Methods for enumeration of forest community structure, forest diversity indices and regeneration status; Nutrient cycling in forest- Carbon and Nitrogen cycle, human influences on global carbon and nitrogen cycles, major impacts of global ecological changes on forests.	16
II	Concept of forest and biodiversity conservation: History of biodiversity conservation; Biodiversity- definition, levels and types; Conservation of natural resources (hotspot areas, wildlife sanctuaries, national parks, biosphere reserve); Global warming and forests- Green House Effect and its consequences, Ozone depletion, Conservations laws and acts. Forest genetics resources of India timber and non-timber species.	16
III	Strategies for conserving forest genetic resources: Documentation and evaluation of forests genetical resources (FGR), in-situ and ex-situ conservation of genetic resources- botanical garden, zoological garden, in vitro conservation: germplasm or gene bank, tissue culture; Biological diversity and its significance. Handling and storage of FGR. Intellectual property rights. Quarantine laws and FGR exchange.	16
IV	Global approaches for forest and biodiversity conservation: Global perspectives - International programmes for biodiversity conservation, convention on biological diversity (CBD), IUCN, CITES, ITTA, UNFCCC, Kyoto Protocol, Ramsar Convention on Wetlands, Cartagena Protocol on Bio-Safety 2000 (CPB); Indian	16

	perspectives – Indian initiatives in biodiversity conservation-biodiversity act 2002, Biodiversity Rules 2004, National biodiversity strategy and action plan (NBSAP), Plant Varieties Protection and Farmer's Rights Act, 2001, National biodiversity authority (NBA), Biodiversity management committee (BMC).	
	Total	64

Text Books:

1. Odum, E. P., & Barrett, G. W. (1971). Fundamentals of ecology (Vol. 3, p. 5). Philadelphia: Saunders.
2. Kimmins, J. P. (1976). Forest Ecology. MacMillan.
3. Ramakrishnan, P. S. (1992). Shifting Agriculture and Sustainable Development. Man and Biosphere Series. The Parthenon Publ. Group.
4. Dhyani, S. N. (1994). Wildlife Management. Rawat Publ. 19

Reference Books:

1. Khan, T.I. & Al-Azmi, D. N. (1999). Global Biodiversity Conservation Measures. Pointer Publ.
2. Nautiyal, S. & Koul, A. K. (1999). Forest Biodiversity and its Conservation Practices in India. Oriental Enterprise.
3. Agrawal, K. C. (2000). Wildlife of India: Conservation and Management. Nidhi Publishers, India.

Paper-II Core	**Principles of Silviculture** **L-T-P-C:4-0-0-4 Credit Unit: 4 Evaluation Scheme: T**	**Course Code FOR144C102**

Course Objective: To provide students with a fundamental understanding of silvicultural principles, forest regeneration techniques, ecological influences on forest growth, and forest classification for sustainable forest management.

Course Outcomes:

On successful completion of the course, the students will able to:		**Bloom's cognitive level**
CO1	Define key concepts of silviculture, forest regeneration, and forest types.	1
CO2	Explain the influence of locality factors, succession, and allelopathy on forests.	2
CO3	Conduct regeneration surveys and assess forest composition in field studies.	3
CO4	Evaluate site conditions and conservation practices for forest management.	4

Detailed Syllabus

Module	Course content	Lecture hours
I	Definition and objectives of silviculture, Influence of locality factors on forest: Locality factors, climatic factors, edaphic factors, ecological and physiographic factors, biotic factors, influence of plant competition, parasites, epiphytes, climber- weeds on forests	16
II	Forest Regeneration: Natural and artificial regeneration, techniques of obtaining regeneration by seeds and coppice, Regeneration Survey in the forest, need and objectives of reforestation and afforestation, choice of species. Forest Ecosystem, Theory of Succession, Kinds of succession, Use of succession in Silviculture/Allelopathic effect to be included	16
III	Basis for classification, Forest Types of India and their distribution according to Champion and Seth's classification. Use of Forest Types in Silviculture. Site maintenance in forest stand, structural management of soils, water management, soil and water conservation practices, use of manures and fertilizers in forestry and soil amendment/Reclamation of soils/ in forestry.	16
IV	Tree Morphology: Crown, Canopy structure and Stratification; Branching pattern, Bole, Buttress, Burrs, Barks- Outer and inner color, texture	16
	TOTAL	64

Text Books:

1. Dwivedi AP. 1993. A Text Book of Silviculture. International Book Distributors, Dehradun.
2. Khanna LS. 1996. Principle and Practice of Silviculture. International Book Distributors.

Reference Books:

1. Smith DM, Larson BC, Ketty MJ & Ashton PMS. 1997.The Practice of Silviculture-Applied Forest Ecology. John Wiley & Sons.

Paper-III Core	**Forest Resources and Economics** **L-T-P-C:4-0-0-4 Credit Unit: 4 Evaluation Scheme: T**	**Course Code FOR144C103**

Course Objective: To provide students with economic principles, resource valuation methods, and ethnobiological significance in forest resource management.

Course Outcomes:

On successful completion of the course, the students will able to:		Bloom's cognitive level
CO1	Understand the principles of forest economics, microeconomics, and their application in forest resource management.	2
CO2	Apply operational research tools to evaluate forest management alternatives and assess the economic importance of key plant families.	3
CO3	Analyse the role of forest ecosystem services, timber, and non-timber forest products in sustainable resource management.	4

Detailed Syllabus

Module	Course content	Lecture hours
I	Concept of forest resources and its economics; Principles of microeconomics and its application in forest resource management; Demand, supply and marketing of forest products; Theory of capital and application in forest resource management; Domestic and international trade in forest products; Impact of socio-economic variables on forest appraisal and management decisions; Natural and environmental resource accounting – methods and implications; Bio-economy and circular economy- a global perspectives.	16
II	Applied forest economics: Application of operational research tools in evaluating forest management alternatives in public and private forest planning and valuation; Characterization and economic importance of selected order and Families of Dicots and Monocots I: Ranales (Magnoliaceae & Annonaceae), Guttiferales (Clusiaceae & Dipterocarpaceae), Malvales (Malvaceae & Sterculiaceae), Ruttales (Rutaceae & Meliaceae), Rosales (Rosaceae & Leguminosae.	16
III	Ethnobiology: Scope, objectives and methodologies of ethnobiology (Ethnobotany and Ethnozoology); Ethnobotany in relation to health care and drug discovery (Ethnomedicine & Ethnopharmacology), Contribution of wildlife products to human welfare; Hunting of wildlife; Importance and prospects of Ethnobiological studies in North Eastern India.	16
IV	Forest ecosystem services and their valuation: Forest Goods and services- the concept and its evolution; History of development of Timber Extraction, Extraction methods, conversion of timber, Multiple applications of wood. Non-timber forest products (NTFPs)- Present production, their management, export and import of non-timber forest products, dependence of people on NTFPs; Important NTFPs: Gums, Resins, Bamboos, Canes, Oil seeds, Tannins, Dyes, Tendu leaves, Broom grass. Pulp and Paper, Lac and Shellac, Cutch & Katha, Cocoa, Alcoholic beverages.	16

	TOTAL	64

Text Books:

1. Indian Forest Products, Vol. I & Vol. II, By ICFRE, Dehradun, 1970
2. Minor Forest Products of India by T. Krishnamuruty, Oxford & IBH Publishing Co. Pvt.Ltd. New Delhi, 1993
3. Composite wood-Research and Development by K.S. Shukla and S.P. Singh, ICFRE DehraDun, 1993
4. Forests: The non-wood resources by A.P. Dwivedi, IBD Dehra Dun, 1992

Reference Books:

1. Kant, S., & Alavalapati, J. R. (Eds.). (2014). Handbook of forest resource economics (pp. 419-420). Earthscan from Routledge.
2. Amacher, G. S., Ollikainen, M., & Koskela, E. (2009). Economics of forest resources (p. 424). Cambridge: Mit Press.

Paper-IV Core	**Forest Biometry** **L-T-P-C:4-0-0-4 Credit Unit: 4 Evaluation Scheme: T**	**Course Code FOR144C104**

Course Objective: To provide students with fundamental knowledge and practical skills in forest mensuration techniques, inventory methods, and growth assessment, enabling them to measure, analyse, and interpret forest resources for sustainable management.

Course Outcomes:

On successful completion of the course, the students will able to:		**Bloom's cognitive level**
CO1	Define key concepts of forest mensuration, including measurement techniques, volume tables, site quality, and forest inventory methods.	1
CO2	Explain the principles and objectives of tree and stand measurements, growth assessment, sampling techniques, and remote sensing applications in forestry.	2
CO3	Demonstrate the use of forest measurement tools such as callipers, tapes, and increment borers to assess tree height, diameter, volume, and biomass.	3
CO4	Evaluate forest growth trends, stand structure, and inventory data using simulation models, sampling techniques, and remote sensing tools for effective forest management.	4

Detailed Syllabus:

Module	Course content	Lecture hours

I	Introduction, definition, objectives and scope of forest mensuration. Scales of measurement; Units of measurement, standards of accuracy implied in their expression; Measurement of singletree - objectives, standard rules governing measurement at breast height. Measurement of tree diameter and girth using rulers, callipers and tapes; Comparison between tape and calliper measurements; Measurements of upper stem diameter and instruments such as Ruler, Calliper, Pentaprism; Bark measurements - objectives, thickness, surface area and volume; Crown measurements - objectives, diameter, height, surface area and volume.	16
II	Volume tables-definition and their classification. Preparation of volume tables. Stand growth, site quality, site index, stand structure, yield tables and preparation of yield tables; Forest Biomass measurement; forest carbon sequestration, emission trading; Determination of age of trees; Tree growth measurements-objectives increment, determination of increment, stump analysis, stem analysis and increment boring; Measuring tree crops - objectives, diameter, diameter and girth classes, height measurement of crop, crop age and crop volume. Stand tables.	16
III	Forest inventory- definition, objectives, kinds of enumeration; Sampling - definition, advantages, kinds of sampling, random sampling- (simple, stratified, multistage and multiphase sampling); Non random sampling (selective, systematic and sequential sampling) sampling design, size and shape of the sampling units Point sampling - horizontal and vertical point sampling;	16
IV	Introduction to remote sensing and its application in forestry. Use of GPS in forest inventory; Measurement stand density. Simulation techniques. Growth and yield prediction models.	16
	TOTAL	64

Text Books:

1. Chaturvedi AN and Khanna LS. 1994. Forest Menstruation. International Book Distributor. Davis LS and Johnson KN.2005.
2. Forest Management. Waveland Press. Husch B, Miller CI and Beers TW. 2003.
3. Forest Menstruation. John Wiley. John AK, Ducey MJ, Beers TW and Husch B. 2017.

Reference Books:

1. Forest Mensuration. Wiley Blackwel. Laar A. Van and Akca A. 2007.
2. Forest Mensuration. Springer, Netherlands. Loctsch I and Haller KE . 1964.
3. Forest Inventory Vol. and Vol II . BLV Verlagsgesellschaft, München, Germany. Michacl S Philip. 1994.
4. Measuring Forests and Trees. CAB International. Prodan M. 1968. Forest Biometrics. Pergamn Press

Paper-V Core	**Practical I-** Forest Ecology and Environmental Assessment **L-T-P-C:0-0-8-4 Credit Unit: 4 Evaluation Scheme: P**	**Course Code FOR144C115**

Course Objective: To equip students with the practical knowledge of forest community structure, ecosystem characteristics, and conservation strategies through practical field studies and laboratory analysis.

Course Outcome:

On successful completion of the course, the students will able to:		**Bloom's cognitive level**
CO1	Apply appropriate methods to assess vegetation characteristics, biodiversity indices, and phenological patterns of forest species.	3
CO2	Analyze soil, water, and carbon stock parameters to understand ecosystem dynamics and environmental changes.	4
CO3	Evaluate conservation practices through field visits, specimen collection, and preparation of comprehensive field reports.	5

Detailed Syllabus:

Modules	**Title of Unit and Contents**	**Hours**
I	Study of forest community structure and its characteristics- Determination of frequency/Density/Abundance/IVI of vegetation. Measurement of Different Biodiversity Indices (Simpson's Biodiversity Index, Shannon's index, etc.). Determine the community structure of a forest stand Check listing and herbarium preparation of flora in and around RGU campus.	15
II	Phenological study of some important tree species in and around RGU campus Measurement of biomass and productivity, Determination of the litter accumulation/decomposition in a forest stand. Study of regeneration status of forest stand.	15
III	Methods of collection of water and analysis of physio-chemical parameters- pH, Temperature, DO, CO2, BOD, salinity, turbidity. Methods of collection of soil and analysis of physio-chemical parameters- texture, pH, moisture, N, P, K, heavy-metals. Estimation of plankton frequency in the aquatic system. Estimation of the carbon stock in forest ecosystem.	15
IV	Trip to nearby forested areas of the state to study forest vegetation, collection and preservation of specimen for submitted a field report. Visit to nearby in- situ conservation site and submission of a report. Visit to nearby ex-situ conservation site and submission of a report.	15
	Total	60

Text Books:

1. Odum, E. P., & Barrett, G. W. (1971). Fundamentals of ecology (Vol. 3, p. 5). Philadelphia: Saunders.
2. Kimmins, J. P. (1976). Forest Ecology. MacMillan.
3. Ramakrishnan, P. S. (1992). Shifting Agriculture and Sustainable Development. Man and Biosphere Series. The Parthenon Publ. Group.
4. Dhyani, S. N. (1994). Wildlife Management. Rawat Publ. 19

Reference Books:

1. Khan, T.I. & Al-Azmi, D. N. (1999). Global Biodiversity Conservation Measures. Pointer Publ.
2. Nautiyal, S. & Koul, A. K. (1999). Forest Biodiversity and its Conservation Practices in India. Oriental Enterprise.
3. Agrawal, K. C. (2000). Wildlife of India: Conservation and Management. Nidhi Publishers, India.

Paper VI Core	**Practical II-** Forest Management, Silviculture, and Tree Measurement **L-T-P-C:0-0-8-4 Credit Unit: 4 Evaluation Scheme: T**	**Course Code FOR144C116**

Course Objective: To provide an hands on training on forest regeneration, tree measurement techniques, and silvicultural practices through practical assessments and field-based studies.

Course Outcome:

On successful completion of the course, the students will able to:		**Bloom's cognitive level**
CO1	Apply methods for identifying tree species, seeds, and coppices, and assess their characteristics for effective forest management	3
CO2	Analyse forest regeneration patterns, volume estimation, and crown profiling for sustainable forest appraisal.	4
CO3	Evaluate advanced tools like GPS, range finders, and vernier calipers for precise measurement of forest parameters.	5

Detailed Syllabus:

Modules	**Title of Unit and Contents**	**Hours**
I	Identification on different types of coppices in the forest. Identification of tree seeds and study of their physical characteristics such as seed moisture, weight, and purity analysis. Study on germination behavior of tree seeds in seed body and controlled conditions.	15

	Determination of seed viability and vigour tests	
II	Visit to different sites to study silvicultural operations undertaken as part of forest management. Regeneration survey of mixed and pure forests Quantification of regeneration and stand establishment Calculations of volume of felled as well as standing trees.	15
III	**Volume table preparation.** Preparation of yield and stand table. Measurement of crown density and crown ratios. Crown profiling of trees and stand. Dendrochronological studies.	15
IV	**Handling of GPS** Range finder for tree height measurement. Measurement of tree basal area using vernier caliper.	15
	Total	60

Text Books:

1. Chaturvedi AN and Khanna LS. 1994. Forest Menstruation. International Book Distributor. Davis LS and Johnson KN.2005.
2. Forest Management. Waveland Press. Husch B, Miller CI and Beers TW. 2003.
3. Forest Menstruation. John Wiley. John AK, Ducey MJ, Beers TW and Husch B. 2017.

Reference Books:

1. Forest Mensuration. Wiley Blackwel. Laar A. Van and Akca A. 2007.
2. Forest Mensuration. Springer, Netherlands. Loctsch I and Haller KE . 1964.
3. Forest Inventory Vol. and Vol II . BLV Verlagsgesellschaft, München, Germany. Michacl S Philip. 1994.
4. Measuring Forests and Trees. CAB International. Prodan M. 1968. Forest Biometrics. Pergamn Press

M. Sc. Forestry in Forestry: Semester-II

Paper I Core	Silviculture II L-T-P-C:4-0-0-4 Credit Unit: 4 Evaluation Scheme: T	Course Code FOR144C201

Course Objective: To understand the principles, classification, and application of silvicultural systems and plantation forestry for sustainable forest management.

Course Outcome:

On successful completion of the course, the students will able to:		Bloom's cognitive level
CO1	Define and classify silvicultural systems and their applications.	1
CO2	Explain plantation techniques and factors affecting plantation success.	2
CO3	Demonstrate tending operations like thinning, pruning, and weed management.	3
CO4	Evaluate suitable silvicultural practices for different ecological conditions.	4

Detailed Syllabus:

Modules	Title of Unit and Contents	Hours
I	Classification of silvicultural systems. High forests and coppice systems. Changing concepts in silvicultural systems Clear felling system and its modifications, Shelter wood system, uniform system, regeneration period, periodic blocks, and group system.	16
II	Irregular shelter wood system, Selection system – characteristics, rotation, felling cycle. Application in India. Coppice system: simple coppice system, coppice with standards, pollard system, Change of systems, types of conversions, conversion from coppice system to high forest.	16
III	Plantation Forestry: Need for manmade plantations. Native vs exotics. Single species plantations vs mixed plantations vs multiple purpose tree (MPT) plantations, Selection of planting stock, Theory and demonstration of tending operation in the natural forests/plantations including weed management cleaning, thinning and pruning etc., Failure of plantations – Reasons (i.e. unsuitable species, non –application of standard techniques). Plantation layout and designs. Care for seedling establishment, Logging operations.	16
IV	Plantation techniques in arid, coastal and hilly areas, water-logged, cold desserts ravines, saline/alkaline areas, sand dune areas, mining areas and salt affected sites, landslide affected and other degraded/vulnerable sites, Silviculture importance of Teak, Sal, Shisam, Deodar. Eucalyptus, Casuarina, Poplar, Khair, Babool, Chir Pine, Bamboo, Melia dubia, Sandal wood.	16
	Total	64

Textbooks:

1. Dwivedi AP. 1992. Agroforestry: Principles and Practices. Oxford and IBH.
2. Dwivedi AP. 1993. A Text Book of Silviculture. International BookDistributors, Dehradun.

Reference Books:

1. Khanna LS. 1996. Principle and Practice of Silviculture. International Book Distributors.
2. Smith DM, Larson BC, Ketty MJ & Ashton PMS. 1997.The Practice of Silviculture-Applied Forest Ecology. John Wiley & Sons.

Paper II Core	**Climate Change and Forestry** **L-T-P-C:4-0-0-4 Credit Unit: 4 Evaluation Scheme: T**	**Course Code FOR144C202**

Course Objective: To provide knowledge on silvicultural practices, restoration strategies, and forest management techniques to enhance carbon sequestration and mitigate climate change impacts.

Course Outcomes:

On successful completion of the course, the students will able to:		**Bloom's cognitive level**
CO1	Apply adaptive silvicultural strategies for sustainable forest management and climate change resilience.	3
CO2	Analyze national and international climate policies, including REDD++, CDM, and the National Action Plan on Climate Change, to understand their implications for forestry.	4
CO3	Evaluate restoration forestry techniques, canopy management, and carbon sequestration potential of Trees Outside Forests (TOFs), homegardens, and urban forests.	5

Detailed Syllabus:

Modules	**Title of Unit and Contents**	**Hours**
I	Forests and climate change. Harnessing Forests for Climate Change Mitigation and adaptation. National action plan on Climate Change of India: Aims and objectives. International climate negotiation, UNFCCC, IPCC, CoP :LULUCF, REDD++ and CDM.	16
II	Silviculture and sustainability-criteria and indicators for sustainable plantation forestry in India-CIFOR guidelines. Silvicultural and stand management strategies for carbon sink maximization and source minimization. Adaptive silviculture for climate change	16
III	Deforestation and degradation trends at global, national and regional levels. Mega development projects, conservation of native and threatened species, management and rehabilitation plans.	16
IV	Restoration forestry-silvicultural treatments for habitat restoration, catchment area treatments. Role of canopy in regulating functional inputs to stand: canopy and forest continuum, Continuous Cover Forestry. Carbon sequestration	16

	potential of Trees Outside forests (TOFs), homegardens and urban forests	
	Total	64

Textbooks:

1. Anderson P and Palik B. 2011. Silviculture for Climate Change. U.S. Department of Agriculture, Forest Service, Climate Change Resource Center.
2. Climate Change: Challenges To Sustainable Development in India. 2008. Research UNIT (Larrdis) Rajya Sabha Secretariat, New Delhi.
3. Greenhouse Gas Emission from Agricultural System, Published by IPCC- USEPA
4. Climate change and global crop productivity Ed. by K R Reddy and HF Hodges CABIPublishing.
5. IPCC Assessment Report. 2007. Climate Change Journal Climate Change: Source,
6. Impact and Policy, Proceeding of 2nd World Climate Conference. Ed. by J Jager and HL.Ferguson, Cambridge University Press.

Reference Books

1. Freer-Smith, P. H., Broadmeadow, M. S., & Lynch, J. M. (Eds.). (2007). Forestry and climate change. CABI.
2. von Gadow, K. (2008). Managing forest ecosystems: the challenge of climate change (Vol. 338). F. Bravo, V. LeMay, & R. Jandl (Eds.). New York: Springer.

Paper III Core	**Seed and Nursery Technology** **L-T-P-C:4-0-0-4 Credit Unit: 4 Evaluation Scheme: T**	**Course Code FOR144C203**

Course Objective: To understand the principles of seed morphology, seed management, nursery practices, and techniques for producing high-quality forest seedlings.

Course Outcomes:

On successful completion of the course, the students will able to:		**Bloom's cognitive level**
CO1	Identify and classify different types of forest seeds and seed treatments.	1
CO2	Explain seed management practices and nursery techniques for healthy seedling production.	2
CO3	Demonstrate nursery practices like sowing, watering, weeding, and transplanting.	3
CO4	Evaluate seed quality, nursery layouts, and propagation structures for optimal plant growth.	4

Detailed Syllabus:

Modules	**Title of Unit and Contents**	**Hours**
I	Seed morphology: Morphology and structuring of seeds, Major types of forest seed, Recalcitrant, Orthodox, Encapsulated and Eglutanized seeds Management of Forestry Seeds: Seed source, collection, processing, storage,testing and pre-sowing	16

	treatments. Seed certification, Pests and pathogens of Forest Seeds and their Management.	
II	Nursery practices: Site selection, type, design and layout, Nursery soil and watermanagement. Seed bed preparation and sowing. Seeding early tending – watering, weeding, and shading	16
III	Rhizobial and mycorrhizal associationsContainer and bare-root seedlings. Pricking out, transplanting, lifting, packing and transportation. Media and mixtures	16
IV	Quality seedling characteristics/characteristics of Quality seedlings Propagation structures: Shade house, poly house, mist chambers Glass houses, nethouses and growth chambers. **Practical:** Seed Quality Testing, Seed viability, pre-treatment and sowing techniques, Nursery Techniques: Poly bag, Nursery raising, lifting, grading and packing of nursery stock, nursery layout, Mist chamber, Glass house, Net house Visit to seed bank (Cryopreservation facilities) Visit to modern nursery for large scale planting stock production	16
	Total	64

Textbooks:

1. Agrawal, R.L. (1986). Seed Technology. Oxford - IBH Publishing Co. New Delhi.
2. Bewely, J.D and Black, M. (1985). Seed- Physiology of development and germination.
3. Bose, T.K.; Mitra, S.K. and Sadhu, M.K. (1986). Propagation of tropical and sub-tropical Horticultural crops. NayaPrakash, Calcutta.

Reference Books:

1. Evans, J. and Turnbull, J.W. (2004). Plantation Forestry in the Tropics. 3rd edition. Oxford University Press.
2. Hartmann, H.T. and Kester, D.E. (1968). Plant propagation – principles and practice prentice – Hall of India Private Limited, New Delhi.
3. ISTA (1993). International Rules for Seed Testing Rules. International Seed Testing Association, Zurich, Switzerland, 1993.

Paper IV Core	**Forest Management** **L-T-P-C: 4-0-0-4 Credit Unit: 4 Evaluation Scheme: T**	**Course Code FOR144C204**

Course Objective:

To provide students with a comprehensive understanding of forest health, focusing on the principles of forest protection, pest and disease management, and integrated approaches for sustainable forest management, equipping them with practical knowledge and skills to address challenges in forestry.

Course Outcome:

On successful completion of the course, the students will able to:		**Bloom's cognitive level**
CO1	Define key terms related to forest management, including principles, practices, yield management, and working plans.	1
CO2	Explain the peculiarities of forest management and the significance of multiple-use approaches in managing forest resources.	2

CO3	Apply the principles of yield management to estimate growing stock, density, quality, and increment in forest stands.	3
CO4	Analyse different management and working plan strategies, identifying their objectives, necessity, and methods of preparation and control.	4

Detailed Syllabus

Modules	**Title of Unit and Contents**	**Hours**
I	**Objectives And Principles** Introduction- Definition and scope. Peculiarities of forest management. History of forest management, Principles and practices of forest management and their applications. Object of Management, Purpose and Policy. Multiple use of forest management. Management of farm plantations	16
II	**Yield Management** Definition and management of yield, felling cycles, cutting sections, and rotation periods. Types of rotations and their choice, even-aged and uneven-aged forest models. Concepts of normal forests, growing stock, and age gradation. Yield regulation principles for even-aged and uneven-aged crops based on area, volume, and increment. Methods of yield regulation and their application in Indian forests.	16
III	**Valuation And Appraisals** Forest valuation: Valuation principles, interest and investment, valuation of forest land and timber stand, valuation of stumpage, tree, non-wood forest outputs, valuation of financial alternatives Appraisal of forest damage: Valuating intensive management decision- spacing and thinning; working plans- preparation and control Ecosystem services and valuation, payment for ecosystem services, NPV	16
IV	**Management And Working Scheme** Working scheme-definitions, objects and necessity, preparation and control National Working Plan Code Management plans (WC Protected Areas) Preparation of working Schemes Field visit for observing application of working plans	16
	Total	64

Textbooks:

1. BalaKathiresan, S. (1986). Essentials of Forest Management, Nataraj Publishers, Dehradun.
2. Bhattacharya, P., Kandya A.K. and Kumar, K. (2008). Joint Forest Management in India, Aavishkar Publisher, Jaipur.
3. Desai, V. (1991). Forest Management in India– Issues and Problems. Himalaya Publisher House, Bombay.
4. Edmunds, D. and Wollenberg, E. (2003). Essentials of Forest Management. Natraj Publishers, Dehradun.

Reference Books:

1. Jerome, L.C. (1983). Timber Management: A Quantitative Approach. John Wiley and Sons.
2. National Working Plan Code. (2014). MoEF, New Delhi.
3. Prakash, R. (1986). Forest Management. IBD, Dehradun, India.
4. Recknagel, A.B. and Bentley. J. (1988). Forest Management. IBD, Dehradun.
5. Trivedi, P.R. and Sudarshan, K.N. (1996). Forest Management. Discovery publications, New Delhi

Paper V Core	Forest Certification L-T-P-C: 4-0-0-4 Credit Unit: 4 Evaluation Scheme: T	Course Code FOR144C205

Course Objective:

The course aims to provide an in-depth understanding of forest certification, its concept, relevance, and evolution. Students will learn about various forest management certification schemes, including their standards, processes, and application in both global and Indian contexts.

Course Outcome:

On successful completion of the course, the students will able to:		Bloom's cognitive level
CO1	Define the basic concepts of forest certification, including its origin, evolution, and types (FM, CoC).	1
CO2	Explain the standards and certification processes at national and international levels, with a focus on NTFPs and their role in sustainable forest management.	2
CO3	Demonstrate how certification and labelling processes work in forestry and NTFP sectors	3
CO4	Analyse the certification framework and policies in India and limitations in forest certification	4
CO5	Evaluate the role of certification for wood-based industries and NTFPs.	5

Detailed Syllabus

Modules	Title of Unit and Contents	Hours
I	Forest certification: concept, definition, origin, evolution, relevance and needs and limitation of forest certification, Scope and opportunity, Emerging issues, trends and schemes, certification and labelling, type of certification- Detail about FM, CoC, fact and figures of certification(Global and India). Trees outside Forests (ToF) certification scheme, QPM certification scheme and eco-tourism certification schemes	16
II	Standards and Certification Processes: Overview of standards, certification, and accreditation. Certification processes at both national and international levels. Managing audits and organizational processes. Introduction to global certification schemes and processes. Bhopal-India certification for criteriaand indicator for Sustainable Forest Management	16
III	Non-Timber Forest Products (NTFPs) and Certification: Role of NTFPs in forest management. Certification of NTFPs: Issues, merits, and demerits. Importance of certification for wood-based industries. Framework for NTFP certification in forest management practices.	16
IV	Forest Certification in India and Policy Framework: Government policies related to forest certification and their objectives. Indian forest certification agencies and standards. Certification for sustainable utilization and management of forest resources. Indian Forest and Wood certification Scheme (IFWCS)-2023. Progress of forest certification in India: Stakeholder expectations and economics. Case study: Visit to a certified industry or government organization.	16
	Total	64

Textbooks:

1. Jeffers JNR. 1978. An Introduction to System Analysis with Ecological Application. Edward Arnold.
2. Jose S. 2009. Agroforestry for Ecosystem Services and Environmental Benefits: an Overview. Agroforestry Systems.

Reference Books:

1. Ecosystem Services: Global Issues and Local Practices. First Edition. Elsevier Publications
2. Paulo ELD and Nunes. 2014. Handbook on the Economics of Ecosystem and Biodiversity. E-book. Sander J, Nicolas D and Hans K. 2014.
3. Jain SK and Singh P. 2000. Economic Analysis of Industrial Agroforestry: Poplar (Populusdeltoides) in Uttar Pradesh (India). Agroforestry Systems.
4. National Working Plan Code-2023

M. Sc. Forestry in Forestry: Semester-III

Paper-I Core	Forest Systematics and Ethnobiology L-T-P-C:3-0-0-3 Credit Unit: 3 Evaluation Scheme: T	Course Code FOR144C301

Course Objective: To provide students with a comprehensive understanding of plant systematics, taxonomy, ethnobotany, and their applications in forest conservation and human welfare.

Course Outcome:

On successful completion of the course, the students will able to:		Bloom's cognitive level
CO1	Define key concepts of systematics, taxonomy, and ethnobotany.	1
CO2	Explain classification systems, plant nomenclature, and taxonomic principles.	2
CO3	Demonstrate herbarium preparation, plant identification, and field collection techniques.	3
CO4	Evaluate the role of ethnobotany in healthcare, drug discovery, and biodiversity conservation.	4

Detailed Syllabus

Modules	Topics & Course content	Periods
I	Principles of Systematics (taxonomy), Systems of classifications; Post Darwinian systematics; Concept of species and genera; Modern trends in Taxonomy, Biosystematics & Numerical Taxonomy; Phenetic, Cladistic, Omega and Alpha taxonomy; Role of taxonomy in management and conservation of forest.	**12**
II	Concept of characters; Botanical keys, their use and construction; Principles of plant nomenclature; Concept of ICBN, Typification; Principle of Priority; Valid publication, Naming of new taxon; Taxonomic literature: Classical literatures, Icons, Flora, Revision and Monograph, Taxonomic research in India, Botanical survey of India, Herbaria of India and abroad.	**12**
III	Characterization and Economic importance of selected order and Families of Dicots and Monocots I: Ranales (Magnoliaceae & Annonaceae), Guttiferales (Clusiaceae & Dipterocarpaceae), Malvales (Malvaceae & Sterculiaceae), Ruttales (Rutaceae & Meliaceae), Rosales (Rosaceae & Leguminosae), Myrtales (Combretaceae & Myrtaceae), Rubiales (Rubiaceae), Verbenales (Verbenaceae), Asterales (Asteraceae), Unisexuales (Euphorbiaceae & Moraceae), Orchidales (Orchidaceae), Palmales (Arecaceae), Poales (Poaceae)	**12**
IV	Scope, objectives and methodologies of ethnobiology (Ethnobotany and Ethnozoology); Ethnobotany in relation to health care and drug	**12**

	discovery (Ethnomedicine & Ethnopharmacology), Contribution of wildlife products to human welfare; Hunting of wildlife; Importance and prospects of Ethnobiological studies in North Eastern India. Practical: Plant collection and Herbarium Technique, Survey, collection and identification of tree flora Phytography (description of plants) and identification of the family, genus and species with the help of Taxonomic literature (Flora etc.).	
Total		**48**

Textbooks:

1. A Text Book of Forest Taxonomy, MP Singh, MP Nayar& RP Ray, Amol Publication, New Delhi, 1994.
2. An Introduction to Plant Taxonomy, C. Jeffery, Cambridge University Press, Cambridge, 1982.
3. Plant Taxonomy – O.P. Sharma, Tata Mac Graw Hill, New Delhi, 1993.
4. Taxonomy of Angiosperms Nair R. Publisher: Aph Publishing Corporation. 2010
5. Plant Taxonomy: Advances and Relevance, 1st Edition: A. K. Pandey, et al. CBS Publisher; 2010

Reference Books:

1. Plant Taxonomy and Biosystematics, C. A. Stace, Edward Arnold, London, 1989.
2. Introduction to the Principle of Taxonomy, V.V. Sivarajan, edited by N. K. P. Robson, Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi, Calcutta.
3. Ethnobotany-Gary J. Martyn, Chapman& Hall, London,1995.

Paper II Core	**Agroforestry Principles & Systems** **L-T-P-C:3-0-0-3 Credit Unit: 3 Evaluation Scheme: T**	**Course Code FOR144C302**

Course Objective: To provide knowledge on agroforestry systems, their design, management, economic aspects, and role in sustainable land use.

Course Outcomes:

On successful completion of the course, the students will able to:		**Bloom's cognitive level**
CO1	Define agroforestry, its classification, and key policies.	1
CO2	Explain tree-crop interactions, planting techniques, and pest management.	2
CO3	Demonstrate agroforestry models and calculate tree volumes.	3
CO4	Assess market trends, economic benefits, and incentives for agroforestry adoption.	4

Detailed Syllabus:

Modules	**Title of Unit and Contents**	**Hours**
I	Agro forestry- definition, meaning, objectives, importance, potential and impediments , Goals, objectives and strategies of National Agro forestry Policy 2014 , Land capability classification and land use, agro-climate zones of India , Concepts of community forestry and social forestry , Elements of Agronomy (cultural practices of agro forestry crops and compatibility with tree) , Elements of horticulture in forestry	10
II	Classification of agro forestry systems: structural, functional and socioeconomic , Major agro forestry practices, their characteristics and examples , Overview of important agro forestry systems in temperate zone , Characteristics of agro forestry trees; Multipurpose tree species ,nitrogen fixing trees;C3,C4 and CAM plants , Important agroforestry trees, shrubs, grasses and medicinal plants in different regions of India for various uses (fodder, fuel, industrial wood, medicines, fruit , wasteland development, urban landscaping) , Design and diagnosis, criteria of good agro forestry design , Example of improved agro forestry models	10
III	Tree management (Planting pattern, nutrient, irrigation and weed management, pruning, coppicing) , Tree-crop interactions , Calculation of volume of standing trees , Measurement of felled trees, volume and weight tables , Estimation of volume of felled trees through sectional areas, Insect-pest problems in agro forestry systems , Basic principles and practices of integrated pest management in agro forestry ecosystems with emphasis on cultural practices , Disease Management in Agro forestry models	10
IV	Basic principles of Economics applied to Agroforestry, Optimization techniques, Planning, Budgeting and Functional analysis, Market intelligence, Demand study, MIS , Marketing of agro forestry products including benefit sharing, Agro forestry potential under REDD regimes, Economic security and incentives to tree growers- Access to credit, insurance, Support prices, Taxes etc. Practical: Visit of agro forestry sites with different crop combinations Harvesting and marketing of agro forestry produce	18
	Total	48

Textbooks:

1. Buck LE, Lassoie, Fernandes ECM 1999. .Agroforestry in Sustainable Agri. Systems. CRC Press.
2. Kumar BM and Nair PKR. 2006. Tropical Homegardens: A Time-Tested Example of Sustainable Agroforestry. Springer publication.
3. Nair PKR and Latt 1998. Directions in Tropical Agroforestry Research. Kluwer.

Reference Books:

1. Kumar BM and Nair PKR. 2013. Carbon Sequestration Potential of Agroforestry Systems: Opportunities and Challenges (Advances in Agroforestry). Springer publication.
2. Nair PKR, Rai MR and Buck LE. 2004. New Vistas in Agroforestry. Kluwer

3. Nair PKR. 1993. An Introduction to Agroforestry. Kluwer Academic Pub.
4. Ong CK and Huxley PK. 1996. Tree Crop Interactions – A Physiological Approach. ICRAF. Peter Huxley. 1999. Multiple Cropping with Woody and Non-Woody Plants. John Wiley and Sons Ltd, Oxford, United Kingdom.
5. Tejwani KG. 1994. Agroforestry in India. Oxford & IBH Publishing Co. Pvt Ltd.
6. Thampan PK. 1993. Trees and Tree Farming. Peekay Tree Crops Development Foundation.
7. Young A. 1997. Agroforestry for Soil Management. CABI.

Paper III Core	**Practical III-** Practical Techniques in Biodiversity and Climate Change Assessment **L-T-P-C:0-0-6-3 Credit Unit: 3 Evaluation Scheme: T**	**Course Code FOR144C313**

Course Objective: To demonstrate skills in plant and animal identification, carbon sequestration measurement, and data analysis to assess forest ecosystem responses to environmental changes

Course Outcome:

On successful completion of the course, the students will able to:		**Bloom's cognitive level**
CO1	Apply taxonomic keys and morphological features for the identification of plants and animals at various taxonomic levels.	3
CO2	Analyze carbon sequestration rates, water use efficiency, and the response of forestry species to climate change and pollution.	4
CO3	Develop skills in data collection, report writing, and effective communication of research findings.	5

Detailed Syllabus:

Modules	**Title of Unit and Contents**	**Hours**
I	Study of the locally available plants based on Macro and Micromorphology Description and identification at family, genus and species levels using standard taxonomic Keys (Floras). Identification of key characters in a lower group of taxa and construction of keys.	15
II	Preparation of Herbarium, Identification of some locally available Bryophytes, Identification of some locally available Pteridophytes, Identification of the animals by use of Taxonomic Keys, morphological characters and other identifying features.	15
III	Process based methods for measuring carbon sequestration rate of Forestry species. Estimation of water use efficiency of forestry species Evaluation of forestry tree response to climate change and environmental pollution	15
IV	Data collection from field for opted problem. Data analysis, report writing, presentation and communication of important findings. Study tour	15
	Total	60

Paper IV Core	**Practical IV-** Agroforestry Systems and Sustainable Land Management **L-T-P-C:0-0-6-3 Credit Unit: 3 Evaluation Scheme: T**	**Course Code FOR144C314**

Course Objective: To demonstrate the ability to assess agroforestry systems and develop suitable models for improving land use and productivity.

Course Outcome:

On successful completion of the course, the students will able to:		**Bloom's cognitive level**
CO1	Analyze plant composition, economic feasibility, and sociocultural aspects of different agroforestry systems.	3
CO2	Evaluate the impact of cropping systems on soil erosion, water quality, and nutrient dynamics.	4
CO3	Design and propose effective agroforestry models for enhancing sustainable land management practices.	5

Detailed Syllabus:

Modules	**Title of Unit and Contents**	**Hours**
I	Visit to agroforestry sites to study different crop combinations Structural analysis and plant composition in different agroforestry systems.	15
II	Economic evaluation of agroforestry systems Sociocultural evaluation of agroforestry systems Field exercise on plot demonstration showing root distribution of different plants.	15
III	Identification and characterization of manures and fertilizers. Effect of different cropping systems on soil erosion and water quality.	15
IV	Survey and analysis of land use systems in the adjoining areas; Study of tree crown architecture; Design and plan of suitable models for improvement of agroforestry problem.	15
	Total	60

Note: Research (Minor)- 8-credit minor research project will commence in the 3rd semester, where students will begin their project work and continue it through the 4th semester which will be merged together with the major project (12 credit).

M. Sc. Forestry in Forestry: Semester-IV

Paper-I Core	**Forest Policy and Law** **L-T-P-C: 4-0-0-4 Credit Unit: 4 Evaluation Scheme: T**	**Course Code FOR144C401**

Course Objective: The course aims to provide students with a comprehensive understanding of forest policy, law, and environmental governance, focusing on national and international legal frameworks.

Course Outcome:

On successful completion of the course, the students will able to:		**Bloom's cognitive level**
CO1	Recall key forest policies in India, such as the National Forest Policies of 1894, 1952, and 1988.	1
CO2	Understand the objectives and significance of major forest and environmental legislation in India	2
CO3	Apply the legal principles of forest and environmental laws in real-life scenarios through case studies.	3

CO4	Analyse the interrelationship between forest law, tribal rights, and environmental protection with a focus on community participation and governance.	4

Detailed Syllabus

Modules	**Title of Unit and Contents**	**Hours**
I	**Forest Policy and Legislation** Foundation, Need, and Scope of Forest Policy: Introduction to the importance of forest policy. National Forest Policies: Overview of the key features of the National Forest Policies of 1894, 1952, and 1988. Forest Law: Legal definitions, objectives of special forest law. Key Legislations: Indian Forest Act, 1927 Forest (Conservation) Act, 1980 and Rules of 2003 Indian Biological Diversity Act, 2002 Tribal Rights and Forest Dwellers Act: Focus on the rights of tribal communities and forest dwellers.	16
II	**Wildlife and Forest Regulation** Wildlife (Protection) Act, 1972: Important provisions and objectives. Case Studies: Analysis of key legal cases related to the above Acts. Forest Regulations: Preliminary understanding of the Indian Penal Code (IPC) and Criminal Procedure Code (CrPC) in relation to forest offenses. Assam Forest Regulation Act, 1891: Salient features and implications.	16
III	**Environmental Policy and Law** Environmental Policy in India: Key principles and historical development. Public Interest Litigation (PIL): Role in environmental protection. Key Environmental Legislations: Environmental (Protection) Act, 1986 The Air (Prevention and Control of Pollution) Act, 1981 The Water (Prevention and Control of Pollution) Act, 1974 Quarantine Law and encroachment and illegal timber extraction	16
IV	**Major international agreements and India's commitments** CITES (Convention on International Trade in Endangered Species) CBD (Convention on Biological Diversity) ITTA (International Tropical Timber Agreement) UNFCCC (United Nations Framework Convention on Climate Change) UNFCCD (United Nations Convention to Combat Desertification) Kyoto Protocol TRIPS (Trade-Related Aspects of Intellectual Property Rights) Ramsar Convention on Wetlands. NDC and different Government missions	16

	Case Studies: Application of international environmental agreements to Indian forest governance and conservation efforts.	
	Total	64

Textbooks:

1. Dutta, R. and Yadav, B. (2012). Supreme Court on Forest Conservation. Universal Law Publishing Co., New Delhi, India.
2. Joy, P. P. (2012). Set up your criminal practice. Swamy Law House, Ernakulam.
3. Shetty, B. J. (1985), A Manual of Law for Forest Officers, Sharda Press, Mangalore.

Reference Books:

1. Takwani, C. K. T and Thakker, M. C. (2012). Takwani Criminal Procedure. Lexis Nexis Butterwarths Wadhwa, Nagpur.
2. Negi S. S. (1996). Forest Laws , BSMPS, Dehradun.

Paper II Core	**Remote Sensing and Geographic Information System** **L-T-P-C: 2-0-0-2 Credit Unit: 2 Evaluation Scheme: T**	**Course Code FOR144C402**

Course Objective: The course aims to equip students with foundational knowledge and practical skills in remote sensing and Geographic Information System (GIS) technologies, with a focus on their applications in forestry and related fields.

Course Outcome:

On successful completion of the course, the students will able to:		**Bloom's cognitive level**
CO1	Recall the basic concepts of remote sensing, GIS, electromagnetic energy, and image classification.	1
CO2	Explain the principles behind aerial photography, visual image interpretation, GIS databases, and the importance of ground truthing.	2

Detailed Syllabus

Modules	**Title of Unit and Contents**	**Hours**
I	REMOTE SENSING Introduction to Remote Sensing, Electromagnetic Energy, Sensors and Scanners Aerial Cameras, Visual Image Interpretation, Digital image Classification, Image Enhancement and Visualization, Geometric Aspects Software of remote sensing, Application of remote sensing in forestry and allied fields. Ground truthing and accuracy assessment	16
II	GEOGRAPHIC INFORMATION SYSTEM Introduction to GIS, Spatial and non-spatial database for GIS analysis Use of global positioning system, Data entry and processing system, Data analysis and visualization, Application of GIS in Forestry and allied subjects	16
	Total	32

Textbooks:

1. Jensen, R.J. (2003). Remote Sensing of the Environment. An Earth Resource Perspective. Pearson and Education.
2. Joseph, G. (2005). Fundamentals of Remote Sensing. Second edition. Universities Press.
3. Lillesand, T.M., Kiefer, W.R. and Chipman,J.W. (2004). Remote Sensing and Image Interpretation. Fourth edition. John Wiley & Sons, Inc., USA.

Reference Books:

1. Reddy, O.G.P. and Sarkar, D. (2012). RS and GIS in Digital Terrain Analysis and Soil Landscape Modelling. NBSS & LUP, Nagpur.
2. Reddy, A.M. (2002). Text Book of Remote Sensing and GIS, BSB Publication, Hyderabad, India.
3. Schowengerdt, R.A. (2006). Remote Sensing: Models and Methods for Image Processing. Elsevier Publication, Oxford, London, UK.

Paper II Core	**Remote Sensing and Geographic Information System Practical** **L-T-P-C: 0-0-4-2 Credit Unit: 2 Evaluation Scheme: P**	**Course Code FOR144C412**

Course Objective: The course aims to equip students with foundational knowledge and practical skills in remote sensing and Geographic Information System (GIS) technologies, with a focus on their applications in forestry and related fields.

Course Outcome:

On successful completion of the course, the students will able to:		**Bloom's cognitive level**
CO1	Apply remote sensing and GIS techniques to analyse spatial data, classify land use, map forest cover, and measure tree attributes.	3
CO2	Analyse remote sensing data and GIS outputs to evaluate environmental changes, forest density, and land use patterns.	4

Detailed Syllabus

Modules	**Title of Unit and Contents**	**Hours**
I	Stereo text, determination of photo / imagery scale, orientation of stereo model, identification of features on stereo pair and aerial photograph Interpretation of coloured details on multispectral and monochromatic images Remote sensing data acquisition from different sources Software operation for image stretching, histogram equalization, rationing, filtering and principal component analysis. Image classification	16
II	Training in operating software on basics of GIS. Geo referencing, geocoding and mosaicing Entry of spatial and non – spatial data Rasterization and labeling of attributes Measuring height and crown diameter of a tree Forest cover and density mapping Land use and land cover use/mapping	16

	Multistage sampling for change detection	
	Total	32

Textbooks:

4. Jensen, R.J. (2003). Remote Sensing of the Environment. An Earth Resource Perspective. Pearson and Education.
5. Joseph, G. (2005). Fundamentals of Remote Sensing. Second edition. Universities Press.
6. Lillesand, T.M., Kiefer, W.R. and Chipman, J. W. (2004). Remote Sensing and Image Interpretation. Fourth edition. John Wiley & Sons, Inc., USA.

Reference Books:

4. Reddy, O.G.P. and Sarkar, D. (2012). RS and GIS in Digital Terrain Analysis and Soil Landscape Modelling. NBSS & LUP, Nagpur.
5. Reddy, A.M. (2002). Text Book of Remote Sensing and GIS, BSB Publication, Hyderabad, India.
6. Schowengerdt, R.A. (2006). Remote Sensing: Models and Methods for Image Processing. Elsevier Publication, Oxford, London, UK.

Note: In the 4th semester, students will undertake a major project work worth **12 credits**, culminating in the submission of a project report. Combined with the 8-credit minor research project from the 3rd semester, the total project work accounts for 20 credits, constituting 50% of the total credits for the second year.