

**SYLLABUS**

**B. Sc. FORESTRYPROGRAMME**

**I & II YEAR**

**School of Sciences**

 **EDITION2014-15**

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**Teaching and Examination Scheme**

**Academic year: 2015-16**

**Department : School of Science Year: 2015-16 Program : B.Sc. Forestry Semester: I**

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| **S.No.** | **Course Code** | **Course Name** | **Credit** | **Contact Hrs/Wk.** | **Exam Hours** | **Weightage (in%)** |
| **L** | **T** | **P** | **CIE** | **ESE**  |
|  |   | **(A)University Core:** |  |  |  |  |  |  |  |
| 1 | EN 101 | * **English Language 1**
 | 2 |   | 0 | 0 | 3 | 40 | 60 |
| 2 (a) (b) | CP 101 | * **Elementary Computer**
 | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
| CP 161 | * **Elementary Computers I Lab**
 | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| 3 | PC 101 | * **Proficiency in Co-curricular Activities**
 | 2 | 0 | 0 | 0 | 0 | 100 | 0 |
|  |  |  **(B) Program Core:** |  |  |  |  |  |  |  |
| 4 (a) (b)  | SC 111 | * **Cytology**
 | 4 | 4 | 0 | 0 | 3 | 40 | 60 |
| SC 161 | * **Cytology Lab**
 | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| 5 (a) (b) | SC 113 | * **Plant Biochemistry**
 | 4 | 4 | 0 | 0 | 3 | 40 | 60 |
| SC 163 | * **Plant Biochemistry Lab**
 | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| 6 (a) (b) | SC 115 | * **Introduction to Tree Science**
 | 4 | 4 | 0 | 0 | 3 | 40 | 60 |
| SC 165 | * **Introduction to Tree Science Lab**
 | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
|  |  | **(C)Program Elective:** |  |  |  |  |  |  |  |
|  |  |  **(D)Open Elective:** |  |  |  |  |  |  |  |
|  |  |  **Total** | 23 | 17 | 0 | 08 |  |

L – Lecture CIE – Continuous Internal Evaluation

T – Tutorial ESE – End Semester Examination

P – Practical

**Signature of Concerned Teacher Signature of Convener-BoS**\_\_\_\_\_\_\_\_\_\_\_\_\_

**Signature of Member Secretary**

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**Teaching and Examination Scheme**

 **To commence from the Academic year:**

**Department : School of Science Year: 2015-16 Program : B.Sc. Forestry Semester: II**

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| **S.No.** | **Course Code** | **Course Name** | **Credit** | **Contact Hrs/Wk.** | **Exam Hours** | **Weightage (in%)** |
| **L** | **T** | **P** | **CIE** | **ESE**  |
|  |   | **(A)University Core:** |  |  |  |  |  |  |  |
| 1 | EM 102 | * **Employability Skills**
 | 1 | 1 | 0 | 0 | 3 | 40 | 60 |
| 2 | PC 102 | * **Proficiency in Co-curricular Activities**
 | 2 | 0 | 0 | 0 | 0 | 100 | 00 |
| 3 | ES 101 | * **Environmental Studies**
 | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
| 4  | EN 102 | * **English Language II**
 | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
| EN 162 | * **English Language II Lab**
 | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
|  |  |  **(B) Program Core:** |  |  |  |  |  |  |  |
| 5  | SC 112 | * **Plant Physiology**
 | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
| SC 162 | * **Plant Physiology Lab**
 | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| 6  | SC 114 | * **Plant Pathology**
 | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
| SC 164 | * **Plant PathologyLab**
 | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| 7 | SC 116 | * **Elementary Microbiology and Soil microbiology**
 | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
| SC 166 | * **Elementary Microbiology and Soil microbiology Lab**
 | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| 8 | SC 118 | * **Elementary Genetics**
 | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
| SC 168 | * **Elementary Genetics Lab**
 | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
|  |  | **(C)Program Elective:** |  |  |  |  |  |  |  |
|  |  |  **(D)Open Elective:** |  |  |  |  |  |  |  |
|  |  |  **Total** | 25 | 18 | 0 | 10 |  |

L – Lecture CIE – Continuous Internal Evaluation

T – Tutorial ESE – End Semester Examination

P – Practical

**Signature of Concerned Teacher Signature of Convener-BoS**\_\_\_\_\_\_\_\_\_\_\_\_\_

**Signature of Member Secretary**

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| **CP 101** | **Elementary Computer** |
| **Prerequisite**  | Nil |
| **Learning objective**  | This course aims to: – give a general understanding of how a computer works* Aware about operating system, various Computer Languages and number system
* Give a general understanding of Internet, information technology, e-commerce and Networks
 |
| **Salient features**  | The students will able to * Understand what is computer and how is it works.
* Understand what number system, operating system, computer language is.

Understanding the Role of Information Technology |
| **Utility** | A B. Tech degree in biotechnology opens doors to job opportunities in science, industry and environmental management, Conservation and Resource Management, Forest Rangers, tree genetics and biotechnology, biotechnology technicians and life science laboratory. |
| **Unit-I** | **Introduction** |
| Types of computers and generations .Basic architecture of computers and its building blocks .Input-Output devices, Memories, Overview, definition and function of operating system, need of operating System, |
| **Unit- II** | **Classification of Computer Languages** |
| Machine, assembly and high level languages .Brief idea of operating systemAssembler, compiler and interpreterNumber Systems :Binary, octal, decimal and hexadecimal representation of numbers.Integers and floating point numbers.Representation of characters, ASCII and EBCDIC codes.Binary Arithmetic: addition, subtraction, complements |
| **Unit-III** | **An overview of information technology** |
| An overview of information technology, difference between data and information, quality, of information, Information system.Introduction to internet: www, web browser, search engine, email, open source software’s, Search Engine optimization |
| **Unit-IV** | **Introduction to e-commerce** |
| Introduction to e-commerce and its advantage, Types of E-Commerce, B2B, B2M, M2B, M2M, Electronic payment system, E-governance, Introduction to Information Security, cryptography, digital signature and smart card technology, |
| **Unit-V** | **Introduction to LAN, WAN, MAN** |
| Transmission mediaData transmission type: Introduction to OSI reference model, Analog and digital signals,, Network topologies, client-server architecture, ISDN, Broad Band |
| **Reference books** | * 1. Computer Fundamentals: Architecture and Organization, by B Ram, New Age International Publisher
	2. Computer Fundamentals: Architecture and Organization, by B Ram, New Age International Publisher
	3. Information Technology and the Networked Economy, Second Edition ByMcKeown, Patrick G.
	4. Internet & Intranet Engineering, Tata McGraw Hill company.
	5. Information Technology by Ajit Poonia.
	6. Information Technology by D.P. Sharma
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| **Mode of Examination** | Assignment/Quiz/Viva-Voce/student seminar/written examination/PPT |
| **Recommended By BOS on:** |  |
| **Approved by academic council on:** |  |

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| **SC115** | **Introduction of Tree Science**  |
| **Prerequisite**  | All students are expected to have a general knowledge of zoology, botany and chemistry. |
| **Learning objective**  | The learning objective of course is: To create an understanding regarding the forestry, To gain knowledge about forest economics, To have understanding about nature of damage. |
| **Salient features**  | The student will be able to conceptualize about forest and their management, Able to analyse management practice regarding rotation problem management. |
| **Utility** | A degree in forestry opens doors to job opportunities in science, industry and environmental management, Conservation and Resource Management, Forest Rangers, tree genetics and biotechnology, forestry technicians and forestry workers. |
| **Unit-I** | **Tree Science Introduction** |
| Introduction to trees and their general classification under different forest types. Important tree families and their peculiar characters. |
| **Unit- II** | **Patterns and Parts of typical flowering trees.** |
| Patterns and Parts of typical flowering trees. Morphology of flowers. Structure and types of trees. Difference betweenthe trees and other plant community. Types of trees and canopy structure. |
| **Unit-III** | **Growth-pattern of trees** |
| Growth-pattern of trees; seedling, saplings, trees, bole and pole stages. Branching patterns of trees. Change in tree morphology with respect to climatic, edaphic and topographic factors. |
| **Unit-IV** | **Tree species.** |
| Coniferous and broad leaved tree species. Trees in tropical, sub-tropica, temperate and alpine regions.  |
| **Unit-V** | **Significance of tree in human life** |
| Significance of tree in human life- tangible and intangible benefits. Identification of different tree species. Important uses of trees. |
| **Reference books** | 1. Shiva, M.P. A Handbook of Systematic Botany, 1986.IBD Publisher, Dehradun.
2. Sagreiya, K.P. Forests and Forestry, 1997. National Book Trust India.
3. Khanna, L. S. 1984. Principles and Practice of Silviculture, Khanna Bhandu,Dehra Dun. P. 476.
4. Ram Prakash and L.S. Khanna. 1991. Theory and Practice of Silvicultural systems. International Book Distributors, Dehra Dun. 298p.
5. Dwivedi, A.P. 1993. A Text Book of Silviculture, International Book Distributors, Dehradun.
6. Dwivedi, A. P. 1992. Principles and Practice of Indian Silviculture, Surya Publication, 420p
 |
| **Mode of Examination** | Assignment/Quiz/Viva-Voce/student seminar/written examination/PPT |
| **Recommended By BOS on:** |  |
| **Approved by academic council on:** |  |

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| **SC111** | **Cytology**  |
| **Prerequisite**  | All students are expected to have a general knowledge of zoology, botany and chemistry. |
| **Learning objective**  | The learning objective of course are: To create an understanding regarding the forestry, To gain knowledge about forest economics, To have understanding about nature of damage, Able to analyse timber management. |
| **Salient features**  | The student will be able to conceptualize about forest and their management, Able to analyse management practice regarding rotation problem management. |
| **Utility** | A degree in forestry opens doors to job opportunities in science, industry and environmental management, Conservation and Resource Management, Forest Rangers, tree genetics and biotechnology, forestry technicians and forestry workers. |
| **Unit-I** | **Origin of Life** |
| Historyofearth,theoriesoforiginoflife natureofthe earliestorganism.Classification,Fivekingdoms,viruses(TMV,HIV,Bacteriophage),Prokaryote(Bacteria-cellstructure,nutrition,reproduction),Protista,Fungi,PlantaeandAnimalia. |
| **Unit- II** | **Introduction to cell** |
| Morphology, size, shape and characteristics of Prokaryotic, Eukaryotic, Plant and animal cells; cell-theory. Cell membrane: Characteristics of cell membrane transport molecules, fluid mosaic model of Singer and Nicolson, concept of unit membrane. Cell membrane transport: Passive (diffusion and osmosis facilitated (mediated) and active transport |
| **Unit-III** | **Cell**  |
| Thecellconcept,structureofprokaryoticandeukaryoticcells,plantcellsandanimalcells,cellmembrances,cellorganellesandtheirfunction. |
| **Unit-IV** | **Tools and techniques used in cell study** |
| Ultrastructures and functions of different cell organelles of eukaryotes and prokaryotes (cell wall, plasmamembrane, nucleus, mitochondria, chloroplast, ribosome, peroxisomes, golgi bodies, etc.). |
| **Unit-V** | **Cell reproduction** |
| Basic features of cell cycle, Mitosis, mitotic spindle and chromosome movement, Process and phases of meiosis and its significance , Cell divisions: cell cycles, mitosis phases. |
| **Reference books** | 1. Molecular Cell biology, Lodish, Berk and others. W.H. Freeman and Co., 2004, Fifth Edition.
2. Principles of Biochemistry, Garrette and Grisham, Saunders College Publishing, 1994.
3. Molecular Cell Biology, Harvey Lodish, Baltimore David *et al*., Scientific American Books, W.H.Freeman and Company, Third Edition, 1995.
4. Bohinski, R.C.(1987): Modern concepts in Biochemistry (Alllyn&Bascon Inc. Boston)
5. Caret et al.(1993): Inorganic, Organic and Biological Chemistry (WMC Brown Publ. USA).
 |
| **Mode of Examination** | Assignment/Quiz/Viva-Voce/student seminar/written examination/PPT |
| **Recommended By BOS on:** |  |
| **Approved by academic council on:** |  |

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| **SC 113** | **Plant Biochemistry**  |
| **Prerequisite**  | All students are expected to have a general knowledge of zoology, botany and chemistry. |
| **Learning objective**  | The learning objective of course are: To create an understanding regarding the forestry, To gain knowledge about forest economics, To have understanding about nature of damage, Able to analyse timber management. |
| **Salient features**  | The student will be able to conceptualize about forest and their management, Able to analyse management practice regarding rotation problem management. |
| **Utility** | A degree in forestry opens doors to job opportunities in science, industry and environmental management, Conservation and Resource Management, Forest Rangers, tree genetics and biotechnology, forestry technicians and forestry workers. |
| **Unit-I** | **CONCEPT OF BIOCHEMISTRY** |
| Biomolecules (The primordial biomolecules, the origin of biomolecules, the fitness of biomolecules, Hierarchy of Biomolecules) Discovery and structure of ATP, Hydrolysis of ATP and role of ATP in Biological reactions |
| **Unit- II** | **BIOMOLECULES (Carbohydrate)** |
| **Carbohydrates**- Simple sugars, reducing and non-reducing sugars. Classification into monosaccharides, oliogsacharides and polysaccharides. Mutarotation and inversion.  |
| **Unit-III** | **BIOMOLECULES** (**Lipids**) |
| **Lipids**– Classification and structure of lipids, Fatty acids- saturated and unsaturated, triacylglycerols, phospholipids and sphingolipids, Fatty acids biosynthesis, Oxidation of fatty acids  |
| **Unit-IV** | **BIOMOLECULES** (**Nucleic acid)**- |
| Bases, Nucleoside and Nucleotide, Phosphodiester bonds, Hydrogen bonding. DNA structure: DNA double helix (Watson and Crick model), Super-coiling, Properties of DNA, Denaturation, Structure of t-RNA |
| **Unit-V** | **BIOMOLECULES (Proteins)** |
| **Proteins**- Structure and classification of amino acids based on polarity, Zwitter ion nature; properties of amino acids, Peptide bond formation, Classification and Structure of proteins (Primary, secondary, tertiary and quaternary) Conformation and Denaturation |
| **Reference books** | 1. Berg, JM., Tymoczko, J.L., Stryer, L. 2006, ***Biochemistry 6th Edition***, W.H. Freeman and Company, New York.
2. Buchanan, B., Gruissem, W. and Jones, R. 2000 ***Biochemistry and Molecular Biology of Plants***  American Society of Plant Biologists.
3. Conn, E.E., Stumpf, P.K. and Bruening, G. 2006 ***Outlines of Biochemistry4th Edition,*** John Wiley and Sons Inc.
4. Donald Voet, Judith.G. Voet and Charlotte W. Pratt (2006) ***Fundamentals of Biochemistry***, 2nd Edition, John Wiley and Sons Inc.
5. Elliot 2009 ***Biochemistry and Molecular Biology*** Oxford Publishers.
6. Harper, 2003, ***Biochemistry,***McGrawHill.
7. Keith Wilson and John Walker 2005 ***Principles and Techniques of Biochemistry and Molecular Biology(6th Edition)***, Cambridge University Press, USA
8. Nelson, D.L., Cox, M.M. 2004 ***Lehninger Principles of Biochemistry, 4th edition***, W.H. Freeman and Company, New York, USA.
9. Stryer, L., 2002, ***Biochemistry***, W.H. Freeman.
10. Voet&Voet, 2000, ***Biochemistry***, John Wiley, New York
 |
| **Mode of Examination** | Assignment/Quiz/Viva-Voce/student seminar/written examination/PPT |
| **Recommended By BOS on:** |  |
| **Approved by academic council on:** |  |

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| **EN 101** | **ENGLISH LANGUAGE 1**  |
| **Prerequisite**  | Nil |
| **Learning objective**  | The learning objective of course are: 1.To develop a professional orientation |
| **Salient features**  | 1. Conduct themselves with professionalism in organizations, 2. To face interview with confidence. 3. To improve the soft skills
 |
| **Utility** | A degree in forestry opens doors to job opportunities in science, industry and environmental management, Conservation and Resource Management, Forest Rangers, tree genetics and biotechnology, forestry technicians and forestry workers. |
| **Unit-I** | **GRAMMAR** |
| Sentences, Prepositions, Subject-verb agreement, Correct Usage- Tenses, Active & Passive, Modals, Direct and indirect Speech, Idioms, Determiners |
| **Unit- II** | **Vocabulary Building** |
| Introduction, Synonyms, Antonyms, Homophones, Homonyms, Words Often Confused, One Word Substitution, Affixes, Select Vocabulary of about 300-500 new words |
| **Unit-III** | **Verbal Communication** |
| Definition, Working with customers, developing professional telephone skills & improving informal communication  |
| **Unit-IV** | **Professional Writing** |
| Writing Official/ Business/ Formal letters; Writing Application and CV; Writing for Official MeetingsReport Writing- Size of the Report, Kinds of Reports, How to write Reports, Format for reportingTechnical Proposals: Parts, Types, Writing of Proposal, Significance.  |
| **Unit-V** | **COMPOSITION** |
| Paragraph Writing- Parts of a paragraph, Writing a good paragraph, Characteristics of a good paragraph; Developing Outlines, Note- making, Review Writing |
| **Reference books** | 1. Communicative Grammar and Composition by Rajesh K. Lidiya,2008 Oxford Uni. Press, New Delhi

2. Communicative Grammar and Composition, by Rajesh K. Lidiya,2013 OUP, New Delhi3. Effective Technical Communication by M. Ashraf Rizvi 2005 ,Tata McGrew Hill New Delhi4. Technical Communication by Meenakshi Raman &Sangeeta Sharma ,2008 OUP New Delhi5. Business Communication by Meenakshi Raman & Prakash singh, OUP, New Delhi6. A Practical Course for developing Writing Skills In English by J.K. Gangal PHI Learning Pvt. Ltd. New Delhi7. Oxford Companion to English Literature U P 8. A glossary of literary terms -M H Abrams |
| **Mode of Examination** | Assignment/Quiz/Viva-Voce/student seminar/written examination/PPT |
| **Recommended By BOS on:** |  |
| **Approved by academic council on:** |  |

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| **ES101** | **ENVIRONMENTAL STUDIES** |
| **Prerequisite**  | All students are expected to have a general knowledge of zoology, botany and chemistry. |
| **Learning objective**  | The learning objective of course are: To create an understanding regarding the forestry, To gain knowledge about forest economics, To have understanding about nature of damage, Able to analyse timber management. |
| **Salient features**  | The student will be able to conceptualize about forest and their management, Able to analyse management practice regarding rotation problem management. |
| **Utility** | A degree in forestry opens doors to job opportunities in science, industry and environmental management, Conservation and Resource Management, Forest Rangers, tree genetics and biotechnology, forestry technicians and forestry workers. |
| **Unit-I** | **Man & Environment** |
| Man & Environment: Definition of Environment & its various components. Ecosystem concepts. Dependence of Man on nature for its various needs. Human population growth & its impacts on environment. Environment & human health. Environmental concerns including climate change, Global warming, Acid Rain, Ozone layer Depletion etc. Environmental ethics. Traditional ways of utilizing various components of environment. Sustainable developments. |
| **Unit- II** | **Natural Resources** |
| Natural Resources: Forest resources, Mining, Dams & their effects on forests & tribal people. Water resources-over utilization of water, floods, droughts and conflicts over water resources. Mineral Resources- Use of various minerals for Human welfare & environmental effects of mining. Food resources -World food problem. Impacts of changing Agriculture practices on Environment. Energy Resources-Renewable and non renewable energy Resources & exploration of alternative energy sources. Land Resources- land degradation, soil erosion, desertification and soil contamination. |
| **Unit-III** | **Ecosystems** |
| Ecosystems: Structure & function, energy flow, food chains, food webs, Ecological pyramids. Basics of forest grasslands, desert & aquatic ecosystem (Ponds, Streams, Lakes, Rivers, Oceans & Estuaries) |
| **Unit-IV** | **Biological Diversity** |
| Biological Diversity: Genetic, species & ecosystem diversity, Values of Biodiversity, Global, National & Local Biodiversity. Hot-spots of Biodiversity, threat to biodiversity. Endangered & endemic species of India. Conservation of biodiversity in situ & ex-situ  |
| **Unit-V** | **Environment pollution** |
| Environment pollution: Causes, effects & control of- Air pollution, Water pollution, Soil pollution, Noise Pollution, Thermal pollution & Nuclear Hazards. Solid wastes & their Management. Disaster Management-Flood, Drought, Earthquake, Landslides etc. |
| **Reference books** | 1. Agarwal KC, 2001. Environmental Biology, Nidi Publishers Ltd. Bikaner.2. BharuchaErach, 2003. The Biodiversity of India, Mapin Publishing Pvt. Ltd, Ahmedabad –3. Brunner RC, 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480pgs.4. Clark RS, Marine Pollution, Clanderson Press, Oxofrd (TB).5. Cunningham WP, Cooper TH, Gorhani E & Hepworth MT, 2001. Environmental Encyclopaedia, JaicoPublishing House, Mumbai |
| **Mode of Examination** | Assignment/Quiz/Viva-Voce/student seminar/written examination/PPT |
| **Recommended By BOS on:** |  |
| **Approved by academic council on:** |  |

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| **EN 102**  | **English language 2**  |
| **Prerequisite**  | Nil |
| **Learning objective**  | The learning objective of course are: 1.To develop a professional orientation |
| **Salient features**  | 1. Conduct themselves with professionalism in organizations, 2. To face interview with confidence. 3. To improve the soft skills
 |
| **Utility** | A degree in forestry opens doors to job opportunities in science, industry and environmental management, Conservation and Resource Management, Forest Rangers, tree genetics and biotechnology, forestry technicians and forestry workers. |
| **Unit-I** | **Commercial Correspondence** |
| 1. Style and Construction
2. Significant Commercial terms and Phrases
3. Letter of Inquiry
4. Letter of Quotation
5. Letter of Order
6. Letter of Execution of Order
7. Letter of Complaint
8. Letter of Collection
9. Circular Letter

Application for Agency |
| **Unit- II** | **Official Correspondence:** |
| Official Letter. Semi-Official Letter. Memorandum Journalistic Competitions on Commercial Topics:1. Editorial Note on a Commercial Topic
2. Letter to the Editor on Economic and Commercial Topics
3. Script Writing for the Media
4. Journalistic Report Writing, Press Release
5. Writing Advertisement Copy
6. Writing for Internet

Precise Writing |
| **Unit-III** | **Theme Writing**  |
| (Report writing/Academic and Journalistic writing) |
| **Unit-IV** | **Paragraph Writing and Essay writing** |
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| **Unit-V** | **Advanced Comprehension** |
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| **Reference books** | 1. Modern English –N. Krishnaswamy, Macmillan publication
2. Oxford Guide to Writing and Speaking – John Selly Oxford University press
3. Communicative Grammar and Composition by Rajesh K. Lidiya,2008 Oxford Uni. Press,

New Delhi4. Communicative Grammar and Composition, by Rajesh K. Lidiya,2013 OUP, New Delhi5. Effective Technical Communication by M. Ashraf Rizvi 2005 ,Tata McGrew Hill New Delhi6. Technical Communication by Meenakshi Raman &Sangeeta Sharma ,2008 OUP New Delhi7. Business Communication by Meenakshi Raman & Prakash singh, OUP, New Delhi8. A Practical Course for developing Writing Skills In English by J.K. Gangal PHI Learning Pvt. Ltd. New Delhi.  |
| **Mode of Examination** | Assignment/Quiz/Viva-Voce/student seminar/written examination/PPT |
| **Recommended By BOS on:** |  |
| **Approved by academic council on:** |  |

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| **SC112** | **PLANT PHYSIOLOGY** |
| **Prerequisite**  | All students are expected to have a general knowledge of zoology, botany and chemistry. |
| **Learning objective**  | The learning objective of course are: To create an understanding regarding the forestry, To gain knowledge about forest economics, To have understanding about nature of damage, Able to analyse timber management. |
| **Salient features**  | The student will be able to conceptualize about forest and their management, Able to analyse management practice regarding rotation problem management. |
| **Utility** | A degree in forestry opens doors to job opportunities in science, industry and environmental management, Conservation and Resource Management, Forest Rangers, tree genetics and biotechnology, forestry technicians and forestry workers. |
| **Unit-I** | **PLANT WATER RELATIONS** |
| Structure and properties of water Absorption of water (active and passive), Ascent of sap; Pathway of water movement; concepts of symplast and apoplast,Guttation and transpiration, Significance of transpiration Physiology role of stomata |
| **Unit- II** | **MINERAL NUTRITION** |
| Macro and Micro nutrients; Role of essential nutrients in plant metabolism and their deficiency symptoms, Absorption of mineral elements, Active and passive absorption, Simple and facilitated diffusion,Donnan equilibrium Role of ATP, Carrier systems, proton pump and ion flux. |
| **Unit-III** | **PHOTOSYNTHESIS**  |
| Definition and Significance**,** Site of photosynthesis, Photochemical phase, Electron transport chain.Photophosphorylation- (cyclic and non cyclic) |
| **Unit-IV** | **PHOTORESPIRATION** |
| - Biosynthetic phase, Benson and Calvin cycle, Hatch and Slack pathway, Photorespiration Significance |
| **Unit-V** | **PLANT GROWTH AND DEVELOPMENT** |
| Physiological effect of Auxin. Cytokinins, Gibberellinsand Ethylene and their role in plant development. Physiology of senescence and abscission Brief outlines on, Photoperiodism, Vernalization. Phytochrome. |
| **Reference books** | 1. Daubenmier, R.F. 1970, Plant Communities, Wiley Eastern Private Limited
2. Daubenmier, RF.1970. Plants and Environment: A text book of Plant Autoecology, Wiley Eastern Private Limited
3. Dennis, D.T., Layzell, D.B., Lefebre, D.D. and Turpin, D.H. (1997) Plant Metabolism. Addison Wesley Longman.
4. Hopkins, W.G. and Huner, P.A. (2008) Introduction to Plant Physiology. John Wiley and Sons.
5. Kandya AK and Gupta A 2007 Advancing frontiers of Ecological Researches in India
6. Kaul RP (2009) Plant Metabolism. Swastik Publishers and Distributors.
7. Koromondy EJ 1996 Concepts of Ecology 4th Edition Prentice-Hall of India Pvt. Ltd. New Delhi
8. Misra KC 1988 Manuals of Plant Ecology (3rd Edition) Oxford and IBH Publishing Co., New Delhi.
9. Mukherjee S., Ghosh AK., 2006 Plant Physiology New Central Book Agency Calcutta
10. Nelson, D.L., Cox, M.M. (2004) Lehninger Principles of Biochemistry, 4th Edition, WH Freeman and Company, New York, USA.
 |
| **Mode of Examination** | Assignment/Quiz/Viva-Voce/student seminar/written examination/PPT |
| **Recommended By BOS on:** |  |
| **Approved by academic council on:** |  |

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| **SC 114**  | **PLANT PATHOLOGY**  |
| **Prerequisite**  | All students are expected to have a general knowledge of zoology, botany and chemistry. |
| **Learning objective**  | The learning objective of course are: To create an understanding regarding the forestry, To gain knowledge about forest economics, To have understanding about nature of damage, Able to analyse timber management. |
| **Salient features**  | The student will be able to conceptualize about forest and their management, Able to analyse management practice regarding rotation problem management. |
| **Utility** | A degree in forestry opens doors to job opportunities in science, industry and environmental management, Conservation and Resource Management, Forest Rangers, tree genetics and biotechnology, forestry technicians and forestry workers. |
| **Unit-I** | **Definition and importance of plant pathology** |
| Definition and importance of plant pathology. Causes of plant diseases. Classification of plant diseases according to cause and occurrence. |
| **Unit- II** | **Plant Pathogens:** |
|  **(a)** Fungi Diagnositic characters of the following genera, Phytophthora, Peronospora, Sclerospora, Ustilago, Sphacelotheca, Tolyposporium, Melampsora, alternaria, Cerospora, Fusarium, HelminthosporiumPyricularia,Rhizoctonia, Colletrotrichum.  |
| **Unit-III** | **Economic importance and general characteristics** |
| (i) Economic importance and general characteristics. (ii) Morphology of different vegetative structures (thallus, mycelium, haustoria, etc.) (iii) Reproduction (iv) Different types of spores. (v) Levels of parasitism  |
| **Unit-IV** | **(b) Bacteria:**  |
| (i) Brief history of bacteria as plant pathogens. (ii) Morphology and Cell structure. (iii) Vegetative reproduction. (iv) Brief outline of classification of plant pathogenic bacteria. |
| **Unit-V** | **Viruses** |
| **( c)**A brief account of mycoplasma. **(d)** Viruses (i) Nature and properties. (ii) Transmission of plant virus (d) Phanerogamic parasites: Cucuta, Loranthuus, Orobanche and striga. |
| **Reference books** | Dhaliwal, G.S. and Arora, R. 2001. Integrated Pest Management – Concepts and Approaches. Kalyani publishers, New Delhi.Dhaliwal. G. S. and Heinnchs, E. A. 1998. Crticial Issues in Integrated Pest Management. Common wealth publishes, New Delhi.Nair, M. C. and Menon. M. R. 1985. Diseases of Crop Plants. Kerala Agricultural University . ThrissurPedigo, T. P. 1996. Entomology and Pest Management. Prentice – Hall of India, New DelhiSanthakumari, P (ed) 2004. Advances in the Diseases of Plantation Crops and Spices, IDB Co., LucknowSingh. R. S 2002. Introduction to Principles of Plant Pathology.Oxford and IBH publishing co.pvt.ltd.bombay |
| **Mode of Examination** | Assignment/Quiz/Viva-Voce/student seminar/written examination/PPT |
| **Recommended By BOS on:** |  |
| **Approved by academic council on:** |  |

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| **SC116** | **Elimentary Microbiology and Soil Microbiology**  |
| **Prerequisite**  | All students are expected to have a general knowledge of zoology, botany and chemistry. |
| **Learning objective**  | The learning objective of course are: To create an understanding regarding the forestry, To gain knowledge about forest economics, To have understanding about nature of damage, Able to analyse timber management. |
| **Salient features**  | The student will be able to conceptualize about forest and their management, Able to analyse management practice regarding rotation problem management. |
| **Utility** | A degree in forestry opens doors to job opportunities in science, industry and environmental management, Conservation and Resource Management, Forest Rangers, tree genetics and biotechnology, forestry technicians and forestry workers. |
| **Unit-I** | **Definition and scope of microbiology** |
| Definition and scope of microbiology – spotaneous generation theory contributions of Antonie Van Leeuwenhoek, Louis, Pasteur John Tyndall , Robert Koch joseph Lister, Winogradsky, Beijerinck, Fleming, Waksman and Frank Branches of microbiology. |
| **Unit- II** | **Microbiology** |
| Microbiology - resolving power – numerical aperture, magnification – different types of microbiology and micrometry. Structure and organization of microbial cell : Prokaryotes and Eucaryotes, Various groups of microorganisms – bacteria , Fungi actinomycetes, algae, protozoa and virus. |
| **Unit-III** | **Methods of isolation and purification** |
| Methods of isolation and purification. Types of nutrional media – sterilization – principles of staining microorganisms. Preservation of microbial cultures. Nutritional types: autotroph, heterotroph, phototroph and chemolithotrophs. Requirements for growth- Temperature, pH and other factors. Growth curve ofbacteria –continuous culture and synchrous culture. |
| **Unit-IV** | **Facters affecting microbial population** |
| Facters affecting microbial population in soil. Microbial decomposition of organic matter – organisms involved – carbon cycle – microbiology of compositing methane and methanogensis. Nitrogen fixation symbiotic and non -symbiotic or free living and associative types |
| **Unit-V** | **Role of mycorrhizae in mobilization** |
| Role of mycorrhizae in mobilization of macro and micronutrients role of mycorrhizae in Role of biofertilizers in afforestation – types of biofertilizers – bacterial biofertilizers – Rhizobium – Azospirillum, Azotobacterphoshobacteria – fungal biofertilizers and quality control |
| **Reference books** | 1. Pelczar,M.J.,Chan, E.C.S.andKreig, N.R. 1993. Microbiology. Tata McGraw Hill Publishing Co., Ltd., New Delhi.
2. Stanier ,R.Y., Ingraham, Wheelis ,M.G. and Paintor ,P.R. 1986.The Microbiology World. Prentice Hall, New Jersey.125
3. Tauro, P., Kapoor, K.K. and Yadav, K.S. 1989 . An Introduction to Microbiology. Wiley Publications ,New Delhi.
4. Alexander, M. 1985. Introduction to Soil Microbiology .John Wiley &Sons , New York.
5. Subba Rao, N.S. 1999 .Biofertilizers in Agricultural and Agroforestry .Oxford &IBH , New Delhi.
6. SubbaRao , N.S. 1995.Soil Microorganisms and Plant Growth .Oxford & IBH , New Delhi.
 |
| **Mode of Examination** | Assignment/Quiz/Viva-Voce/student seminar/written examination/PPT |
| **Recommended By BOS on:** |  |
| **Approved by academic council on:** |  |

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| **SC118** | **Elementary Genetic**  |
| **Prerequisite**  | All students are expected to have a general knowledge of zoology, botany and chemistry. |
| **Learning objective**  | The learning objective of course are: To create an understanding regarding the forestry, To gain knowledge about forest economics, To have understanding about nature of damage, Able to analyse timber management. |
| **Salient features**  | The student will be able to conceptualize about forest and their management, Able to analyse management practice regarding rotation problem management. |
| **Utility** | A degree in forestry opens doors to job opportunities in science, industry and environmental management, Conservation and Resource Management, Forest Rangers, tree genetics and biotechnology, forestry technicians and forestry workers. |
| **Unit-I** | **Historical development in genetics** |
| Definition, significance and historical development in genetics. Mendel’s principles of heredity, deviation from Mendelian inheritance, pleiotropy, threshold characters, co-dominance |
| **Unit- II** | **Theory of inheritance,** |
| Chromosome theory of inheritance, gene interaction: modification of monohybrid and dihybrid ratios. Multiple alleles, quantitative inheritance, linkage and crossing over, sex linked inheritance and characters |
| **Unit-III** | **Structure of DNA and its replication** |
| Structure of DNA and its replication. Evidences to prove DNA as genetic material. Mutation and its classification. |
| **Unit-IV** | **Chromosomal aberrations:** |
| Chromosomal aberrations: Changes in chromosome structure and number Genetic Code ,Transcription and Translation |
| **Unit-V** | **Microbial genetics** |
| Microbial genetics- conjugation, Transformation, Transudation |
| **Reference books** | 1. Gupta P K 1999 Cytogenetics Rastogi Publishers, Meerut
2. Lewin, B2005 Genes IX Oxford University Press, New York
3. Phundan Singh 1995Elements of genetics Kalyani Publishers, Ludhiana
4. Prasad, G. 1989 Introduction to Cytogenetics Kalyani Publishers, Ludhiana
5. Strickberger, M.W. 1996. Genetics(3rd edn.). Mac Millan Publishing Co., New Delhi
6. Swanson, C.P., Merz, T. and Young, J.1975 Cytogenetics Prentice Hall of India Private
7. Limited, New Delhi
8. Winchester A M 1967 Genetics (3 rdedn )Oxford and IBH Publishing Co New Delhi
 |
| **Mode of Examination** | Assignment/Quiz/Viva-Voce/student seminar/written examination/PPT |
| **Recommended By BOS on:** |  |
| **Approved by academic council on:** |  |

 

**SYLLABUS**

**B. Sc. FORESTRYPROGRAMME IIYEAR**

**School of Sciences**

**EDITION2014-15**

**SCHOOL OF SCIENCES**

**B. Sc. FORESTRY/ AGRICULTURE Course II Year**

**Teaching & Examination Scheme**

**Edition2015**

#### B.Sc. FORESTRY II year Semester: III

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S.****No.** | **Course code** | **Course Name** | **Credits** | **ContactHrs/Wk.** | **ExamHrs.** | **Weightage(in%)** |
| **L** | **T/S** | **P** | **CE** | **ESE** |
|  |  | 1. **Theory**
 |  |  |  |  |  |  |  |
| 1 | SC 115 | Forest Entomology and Pest management | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
| 2 | SC 117 | Forest soil survey ,land use and remote sensing | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
| 3 | SC 119 | Silviculture system of Indian Trees | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
| 4 | SC 121 | Agrometerology | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
| 5 | HS 203 | Principal of Forest Economics  | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
| 6.  | EM 103 |  Employability skills  | 1 | 1 | 0 | 0 | 3 | 40 | 60 |
|  |  | **B. Practicals****B.Practical&Sessional:** |  |  |  |  |  |  |  |
| 6 | SC 165 | Forest Entomology and Pest management Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| 7 | SC 167 | Forest soil survey ,land use and remote sensing Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| 8 | SC 169 | Silviculture system of Indian Trees Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| 9 | SC 171 | Agro-meterologyLab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| 10.  | SC 173 |  Seminar  | 2 | 0 | 2 | 0 | 2 | 100 | 00 |
| 11 | PCA103 | Proficiency in Co-curricular Activities | 2 | 0 | 0 | 0 | 0 | 100 | 0 |
|  |  | **Total** |  **23** | **15** | **2** | **8** |  |  |  |

**B. Sc. FORESTRY Course II year Semester: IV**

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| **S.****No.** | **Course code** | **Course Name** | **Credits** | **ContactHrs/Wk.** | **ExamHrs.** | **Weightage(in%)** |
| **L** | **T/S** | **P** | **CE** | **ESE** |
|  |  | 1. **Theory**
 |  |  |  |  |  |  |  |
| 1 | SC 120 | Forest Management & working plan | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
| 2 | SC 122 | Wood anatomy & Technology | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
| 3 | SC 124 | Fertility of forest soil &nutrient management | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
| 4 | SC 126 | Agroforestry & social Forestry | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
| 5 | SC 128 | Nursery management &seedling management | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
| 6 | EM 104 |  Employability skills  | 1 | 1 | 0 | 0 | 3 | 40 | 60 |
|  |  | **B.Practical&Sessional:** |  |  |  |  |  |  |  |
| 6 | SC 170 | Forest Management & working plan Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| 7 | SC 172 | Wood anatomy & Technology Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| 8 | SC 174 | Fertility of forest soil &nutrient management Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| 9 | SC 176 | Agroforestry & social Forestry Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| 10 | SC 178 | Nursery management &seedling management Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| 11 | PCA 104 | Proficiency in Co-curricular Activities | 2 | 0 | 0 | 0 | 0 | 100 | 0 |
|  |  | **Total** | **23** | **15** | **0** | **10** |  |  |  |

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| **SC115** | **FOREST ENTOMOLOGY AND PEST MANAGEMENT**  |
| **Prerequisite**  | All students are expected to have a general knowledge of insects, pest, and management principles. |
| **Learning objective**  | The learning objective of course are: To create an understanding regarding the Entomology, To gain knowledge about reproduction in insects, To have understanding about nature of damage, Able to analyse timber management. |
| **Salient features**  | The student will be able to conceptualize about entomology and management, Able to analyse management practice regarding pest management. |
| **Utility** | A degree in forestry opens doors to job opportunities in science, industry and environmental management, Conservation and Resource Management, Forest Rangers, tree genetics and biotechnology, forestry technicians and forestry workers. |
| **Unit-I** | **Introduction to Entomology** |
| Definition, importance and scope of Entomology. Definition of insect and its position in the Animal Kingdom. Important characters of phylum arthropoda and class insecta. External morphology of generalized insect. |
| **Unit- II** | **Reproduction in insects** |
| Insect growth and development, Reproduction in insects, immature stages (Egg. Larvae/Nymph and Pupae); metamorphosis in Insects Taxonomic classification of class Insecta, diagnostic characters of the orders and major families of economic importance. |
| **Unit-III** | **Principles of pest control** |
| History and importance of Forest Entomology in India. Methods and principles of pest control: Mechanical, physical, silvicultural, legal, biological and chemical. Principles and techniques of Integrated Pest Management in forests. Classification of forest pests : types of damages and symptoms; factors for outbreak of pests. |
| **Unit-IV** | **Nature of damage and management** |
| Nature of damage and management: Insect pests of forest seeds, forest nursery and standing trees of timber yielding species of natural forest (Tectona, Dalbergia sp., Sal, Albizia spp., Sandal, Ailanthus, Gmelina, Terminalia, Deodar, Pines); Plantation forest species (Eucalyptus, Bamboo, Casuarina, Neem, Acacia) Fruit trees (Emblica, Ber, Eugenia, Tamarind). |
| **Unit-V** | **Timbers and their management** |
| Insect pests of freshly felled trees, finished timbers and their management. Morphology of plant parasitic nematodes, brief classification of important genera of nematodes. Important diseases caused by different genera and their management practices. |
| **Reference books** | 1. Brues, T.C., A.L. Melander and E.M. Carpenta, 1954. Classification of Insects, Cambridge Man, USA. 917p.2. Perris, G.F. 1928. The principles of Systematic Entomology. Standford University Press. California, 169p.3. Richards, O.N. and R.G. Davies. 1977. Imm’s General Textbook of Entomology. 10th ED. Chapman and Hall. Vol. 1 and 2. 886p4. Kapoor, V.C. 1988. Theory and Practice of Animal Taxonomy. Oxford and IBH Publishing Co. Pvt Ltd, New Delhi. 234p.5. Mayr, E. 1969. Principles of Systematic zoology. McGraw Hill book Company, New York. 428p.6. Mayr, E., E.G. Linslay and R.L. Usinger. 1953. Methods and principles of Systematic zoology. McGraw Hill Book Company, London. 336p.7. Saxena, S.C. 1992. Biology of insects. Oxford and IBH Publishing Co., Pvt Ltd., New Delhi, 336p. |
| **Mode of Examination** | Assignment/Quiz/Viva-Voce/student seminar/written examination/PPT |
| **Recommended By BOS on:** |  |
| **Approved by academic council on:** |  |

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| **SC117**  | **FOREST SOIL SURVEY, LAND USE & REMOTE SENSING** |
| **Prerequisite**  | All students are expected to have a general knowledge of Soil, and forest types. |
| **Learning objective**  | The learning objective of course are: To create an understanding regarding the Forest soil survey, To gain knowledge about remote sensing, To have understanding about principle of remote sensing, Able to analyse application of remote sensing. |
| **Salient features**  | The student will be able to conceptualize about methodology of soil survey, Able to analyzeinformation through remote sensing. |
| **Utility** | A degree in forestry opens doors to job opportunities in science, industry and environmental management, Conservation and Resource Management, Forest Rangers, tree genetics and biotechnology, forestry technicians and forestry workers. |
| **Unit-I** | **Introduction to surveying** |
| Surveying: Introduction, classification and basic principles, Linear measurements. Chain surveying. Compass survey. Errors in measurements, their elimination and correction. |
| **Unit- II** | **Objective of soil survey** |
| Scope and objective; soil survey, sampling methods; planning, inventory, permanentsample plots; sample size allocation, land use classes and planning. |
| **Unit-III** | **Remote sensing** |
| Aerial photography and remote sensing-definition, meaning, scope, merits and brief history. Electromagnetic spectrum; radiations, differential reflections by surfaces, active and passive remote sensing, earth observation satellites. |
| **Unit-IV** | **Application of Remote sensing** |
| Equipment and materials-aerial bases, cameras, filters, stereoscopes, computers, radars. Photogrammetry: Vertical and oblique photography. Photographs and images, scales, resolution, photo interpretation, photogrammetry, image analysis, mapping. Agencies involved in remote sensing and acquiring information from them. |
| **Unit-V** | **Principal of Remote sensing** |
| Remote sensing; principles, uses in forestry, status monitoring, fire,vegetation/cover classification and mapping, species identification, height and volume – estimation. Identification of tree species and their form stand delineation. Geographic Information systems- Computer softwares used. |
| **Reference books** | 1. Hamilton, I.S. 1987. Forest and Watershed Development and Conservation in Asia and the Pacific, International Book Distributors, Dehra Dun.2. Rama Rao. 1980. Soil Conservation. Standard Book Depot, Bangalore.3. Richard, Lee. 1980. Forest Hydrology, Columbia University Press, New York.4. Curran, P.J. 1985. Principles of Remote Sensing, Long man Group Ltd., England5. Janssen, L.F.2000. Principles of Remote Sensing. ITC. Edl. Text Book Series II. The Netherlands6. Rolf A.de By. 2000. Principles of Geographical Information Systems. ITC. Edl. Text Book Series I. The Netherlands7. Sabins, F.F.1978. Remote Sensing-Principles and Interpretation. W.H.Freeman and Co., San Francisco.8. Sharma, M.K.1986. Remote Sensing and Forest Surveys, International Book Distributors, Dehra Dun. |
| **Mode of Examination** | Assignment/Quiz/Viva-Voce/student seminar/written examination/PPT |
| **Recommended By BOS on:** |  |
| **Approved by academic council on:** |  |
| **SC 119**  | **Silviculture system of Indian Trees** |
| **Prerequisite**  | All students are expected to have a general knowledge of Soil, and forest types. |
| **Learning objective**  | The learning objective of course are: To create an understanding regarding the Forest soil survey, To gain knowledge about remote sensing, To have understanding about principle of remote sensing, Able to analyse application of remote sensing. |
| **Salient features**  | The student will be able to conceptualize about Silviculture, Able to analyze regeneration methods of forest. |
| **Utility** | A degree in forestry opens doors to job opportunities in science, industry and environmental management, Conservation and Resource Management, Forest Rangers, tree genetics and biotechnology, forestry technicians and forestry workers. |
| **Unit-I** | **Definition of forest and forestry** |
| Definition of forest and forestry, Classification of forest and forestry, branches of forestry and theirRelationships, Definition, objectives and scope of Silviculture. Status of forests in India and their role. History of forestry development in India. |
| **Unit- II** | **Climatic factors** |
| Site factors - climatic, edaphic, physiographic, biotic and their interactions. Classification of climatic factors. Role played by light, temperature, rainfall, snow, wind, humidity and evapo-transpiration in relation to forest vegetation.Bioclimate and micro climate effects. Edaphic factors - influence of biological agencies, parent rock, topographyon the soil formation. |
| **Unit-III** | **Physical and chemical properties of soil** |
| Soil profile -physical and chemical properties, mineral nutrient and their role, soil moisture and its influence on forest production.Physiographic factors - influence of altitude, latitude, aspect and lope on vegetation.Biotic factors - influence of plants, insects, wild animals, man and domestic animals on vegetation. Impacts of controlled burning and grazing. |
| **Unit-IV** | **Influence of forests on environment** |
| Influence of forests on environment. Trees and their distinguishing features. Growth and development. Forest reproduction - flowering, fruiting and seeding behaviour. Natural, artificial and mixed regeneration. Natural regeneration – seed production, seed dispersal, germination and establishment.Requirement for natural regeneration. Dieback in seedling with examples. Plant succession, competition and tolerance. |
| **Unit-V** | **Forest types of India and their distribution** |
| Origin, distribution, general description, phenology, silvicultural characters, regeneration methods, silvicultural systems and economic importance of the following conifer and broadleaved tree species of India. Conifers: *Abiespindrow, Piceasmithiana, Cedrusdeodara, Pinusroxburghii, Pinuswallichiana, P. gerardiana and Juniperusmacropoda*. Broad leaved species*: Tectonagrandis, Shorearobusta, Acacia spp.* |
| **Reference books** | 1. Khanna, L. S. 1984. Principles and Practice of Silviculture, Khanna Bhandu, Dehra Dun. P. 476.2. Ram Prakash and L.S. Khanna. 1991. Theory and Practice of Silvicultural systems. International Book Distributors, Dehra Dun. 298p.3. Dwivedi, A.P. 1993. A Text Book of Silviculture, International Book Distributors, Dehradun.4. Dwivedi, A. P. 1992. Principles and Practice of Indian Silviculture, Surya Publication, 420p.5. Champman, G.W. and Allan, T.G. 1978. Establishment Techniques for Forest Plantation F.A.O Forestry Paper No.8. F.A.O Rome.6. David M. Smith. 1989. "The Practice of silviculture". EBD Educational Pvt. Ltd. Dehradun, India. |
| **Mode of Examination** | Assignment/Quiz/Viva-Voce/student seminar/written examination/PPT |
| **Recommended By BOS on:** |  |
| **Approved by academic council on:** |  |

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| **SC 121**  | **Agrometerology** |
| **Prerequisite**  | All students are expected to have a general knowledge of environment and climatic factor. |
| **Learning objective**  | The learning objective of course are: To create an understanding regarding the Agrometeorology, To gain knowledge about reproduction in insects, To have understanding about nature of damage, Able to analyze timber management. |
| **Salient features**  | The student will be able to conceptualize about whether and climate, Able to whether and climate on growth. |
| **Utility** | A degree in forestry opens doors to job opportunities in science, industry and environmental management, Conservation and Resource Management, Forest Rangers, tree genetics and biotechnology, forestry technicians and forestry workers. |
| **Unit-I** | **Agrometeorology** |
| Agrometeorology-definition, aim and scope. Factors and elements of weather and climate. |
| **Unit- II** | **Composition and structure of atmosphere** |
| Composition and structure of atmosphere. Air and soil temperature regimes, atmospheric humidity, types of clouds and precipitation, hails and frost. |
| **Unit-III** | **Cyclones, anticyclones and thunderstorms** |
| Cyclones, anticyclones and thunderstorms. Solar radiations-components and effect on plant growth. Wind as a source of energy. |
| **Unit-IV** | **Effect of weather and climate on the growth** |
| Effect of weather and climate on the growth and development of crops. Climatic normals for crops. Agroclimatic zones of India and Uttar Pradesh. |
| **Unit-V** | **Evaporation and transpiration** |
| Evaporation and transpiration. Use of remote sensing techniques in agrometerology. Agriculture weather forecasting. |
| **Reference books** | 1. Ghadekar, Agrometeorology2. Indian Forester – June and July Issue of 2003.3. Iyer, C.S.P. 2001. Emerging trends in environmental science. Asiatech Publishers Inc., New Delhi. P.304.4. Peter Thompson. 1991. Global warming – The debate. Strategy Europe Ltd., London, U.K. p. 130.5. Satish Tiwari. 2000. Environment and Forest. Anmol Publication Pvt. Ltd., New Delhi. P.302.6. Sunit Gupta. 2000. Global Environment – Current Status. Sarup& Sons., New Delhi. P.508 |
| **Mode of Examination** | Assignment/Quiz/Viva-Voce/student seminar/written examination/PPT |
| **Recommended By BOS on:** |  |
| **Approved by academic council on:** |  |

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| **HS 203** | **Principal of Forest Economics** |
| **Prerequisite**  | All students are expected to have a general knowledge of forest, and general principles of economics. |
| **Learning objective**  | The learning objective of course are: To create an understanding regarding the Forest economics, To gain knowledge about Linear programming, To have understanding about consumer behaviors, Able to analyze supply and demand. |
| **Salient features**  | The student will be able to conceptualize about marginal analysis with reference to forest. Able to analyzeValuation of timber and non-timber forest products. |
| **Utility** | A degree in forestry opens doors to job opportunities in science, industry and environmental management, Conservation and Resource Management, Forest Rangers, tree genetics and biotechnology, forestry technicians and forestry workers. |
| **Unit-I** | **Theory Nature and scope of forest economics** |
| Theory Nature and scope of forest economics, importance of forestry in economic development. Concepts of demand, derived demand and supply with special reference forestry outputs. Basics of marginal analysis and its applications in economic analysis of forestry production systems. |
| **Unit- II** | **Basics of Linear Programming.** |
| Basics of Linear Programming. Financial and economic rotations. Fundamentals of project planning and evaluation and network scheduling techniques. Valuation of timber and non-timber forest products. Economics as social science – Forest Economics - Definitions and concepts – Nature and scope of Forest economics - Divisions of Forest economics – Approaches to the study of Forest economics – Forest Economics Vs Agricultural Economics. |
| **Unit-III** | **Theory of consumer behavior** |
| Consumption – theory of consumer behavior – laws of consumption – classification of goods – wants their characteristics and classification – Utility and its measurement – cardinal and ordinal – Law of Diminishing Marginal Utility - Law of Equimarginal utility – Indifference curve and its Properties – Consumer equilibrium. |
| **Unit-IV** | **Theory of demand** |
| Theory of demand – demand schedule and Curve – market demand – price, income and cross elasticity’s Engel’s low of family Expenditure – Consumer’s surplus. Theory of firm –factors of production – land and its characteristics – labour and division of labor – theories of population – capital and its characteristics – classification of capital – capital formation – enterprises-forms of business organisation merits and demerits. |
| **Unit-V** | **Laws of returns** |
| Laws of returns – Low of Diminishing Magginal Returns Returns . Cost concepts Law of Supply- supply schedule and curve –elasticized market equilibrium. Distribution – theories of rent, wage interest and profit. National income – Seetoral distribution. Money –theory and functions of money. Banking – role of central and commercial banks. Public finance and taxation. Inflation and control measures. International trade and balance of payments. |
| **Reference books** | 1. Ramchandra and Rahul Agrawal, Principles of Forest Economics, Neha Publishers & Distributors.
2. 1. Edwin S. Mills, Economic Analysis of Environmental Problems (New York: Columbia University Press), 1975.
3. Fisher, A.C., Resource and Environmental Economics (New York: John Wiley & Sons), 1979.
4. Orris C. Herfindahl, Natural Resource Information for Economic Development (Baltimore: The Johns Hopkins University Press), 1969.
5. Sharma, S.D., A New Approach to Linear Programming (Meerut: Kedarnath, Ramnath and Co.), 1975.
6. Tony Prato, Natural Resource and Environmental Economics (Ames: Iowa State University Press), 1998.
 |
| **Mode of Examination** | Assignment/Quiz/Viva-Voce/student seminar/written examination/PPT |
| **Recommended By BOS on:** |  |
| **Approved by academic council on:** |  |

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| **SC120** | **FOREST MANAGEMENT AND WORKING PLAN**  |
| **Prerequisite**  | All students are expected to have a general knowledge of forest, and management principles. |
| **Learning objective**  | The learning objective of course are: To create an understanding regarding the forest management, To gain knowledge about working plan, To have understanding about joint forest management. |
| **Salient features**  | The student will be able to conceptualize about constitution of a working plan, Able to analyse rotation problem. |
| **Utility** | A degree in forestry opens doors to job opportunities in science, industry and environmental management, Conservation and Resource Management, Forest Rangers, tree genetics and biotechnology, forestry technicians and forestry workers. |
| **Unit-I** | **Principles of forest management** |
| Introduction: definition and scope. Peculiarities of forest management. Principles of forest management and their applications. Objects of management, purpose and policy. Sustained and progressive yield concept and meaning. General definitions – management and administrative units, felling cycle, cutting section. Rotations: definition, kinds of rotations, choice of rotations,length of rotations and conversion period. |
| **Unit- II** | **Forest: definition and concept** |
| Normal forest: definition and concept. Evenaged and unevenaged models. Estimation of growing stock, density, quantity and increment. Yield regulation – general principles of even aged and unevenaged forestcrop.Yield regulation based on area, volume, area and volume, increment and number of trees. |
| **Unit-III** | **Working Plan** |
| Working Plan – definition, objects and necessity. Normal age gradation in regular and irregular forests – felling series in selection forest and coppice with standard systemIncrement - CAI –MAI – relationship. Growing stock – concept and definition –detemination of growing stock – Normal growing stock in regular, shelter wood system, selection system. |
| **Unit-IV** | **Joint forest management** |
| Joint forest management \_ concept and methodology – successful citations for Indian Scenario. Working plans – Introduction - definitions – object and scope –preparation of working plans – preliminary working plan report. |
| **Unit-V** | **Constitution of a Working Plan** |
| Constitution of a Working Plan division –fieldwork – compartment histories – maps –working plan map, soil map, regeneration maps, forest type map, management map. Method of writing working plan – Part-I and Part II – Use of modern tools in WP preparation. |
| **Reference books** | 1. Ram Prakash. Forest management, 2006, IBD Publication, Dehradun2. Osmaston, F.C. Management of Forests, 1984. IBD Publication, Dehradun.3. Speight, M.S. and D. Wainhouse 1989. Ecology and Management of Forest Insects. Clarendon Press, Oxford.4. Brown, A. 1990. Forest Fire and its Control. Natraj Publishers, Dehra Dun.5. Gupta, V.K. and N.K. Sharma. 1988. Tree Protection. Indian Society of Tree Scientists, Solan.6. Herrick, G.W. 1988. Insect Enemies of Trees. Pioneer Publishers, Jaipur.7. Khanna, L.S. 1984. Forest Protection, Khanna Bandhu, Dehra Dun.8. Kumar, V. 1995. Nursery and Plantation practices in Forestry. Scientific Publishers Jodhpur. |
| **Mode of Examination** | Assignment/Quiz/Viva-Voce/student seminar/written examination/PPT |
| **Recommended By BOS on:** |  |
| **Approved by academic council on:** |  |

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| **SC 122** | **WOOD ANATOMY AND TECHNOLOGY**  |
| **Prerequisite**  | All students are expected to have a general knowledge of forest, plant cell and tissues. |
| **Learning objective**  | The learning objective of course are: To create an understanding regarding the wood, To gain knowledge about anatomy of wood, To have understanding about nature of abnormalities in wood, Able to analyze wood technology. |
| **Salient features**  | The student will be able to conceptualize about wood anatomy, Able to analyzemacroscopic features of wood. |
| **Utility** | A degree in forestry opens doors to job opportunities in science, industry and environmental management, Conservation and Resource Management, Forest Rangers, tree genetics and biotechnology, forestry technicians and forestry workers. |
| **Unit-I** | **Introduction to Wood Anatomy** |
| Introduction to Wood Anatomy. The plant body – Cell and organelles, meristems, promeristem, primary meristem, secondary meristem, apical and intercalary meristems. |
| **Unit- II** | **Structure of tissues** |
| Simple tissues- parenchyma, collenchyma, sclerenchyma. Complex and vascular tissues. Anatomy of stems and roots of dicots and monocots. The secondary growth in woody plants. |
| **Unit-III** | **Mechanism of wood formation** |
| Mechanism of wood formation. Formation of early and late wood, growth rings, transformation of sapwood to heartwood. |
| **Unit-IV** | **The macroscopic features of wood** |
| The macroscopic features of wood, bark- sapwood, heartwood, pith, growth rings, wood rays, resin or gum-canals. Cell inclusions. Physical properties of wood; colour, hardness, weight, texture, grain, lusture, etc. |
| **Unit-V** | **Abnormalities in wood** |
| Abnormalities in wood -- deviation from typical growth form (leaning, bending, crook, fork, buttress), grain deviation, false and discontinuous growth rings. Reaction wood-compression and tension wood. |
| **Reference books** | 1. Anonymous. 1976. Indian forest utilization. Volume I and II ICFRE Publication, Dehradun.2. Mehta, T. 1981. A handbook of forest utilization. Periodical Expert Book Agency, Delhi. 298 p.3. Rao, K.R. and Juneja, K.B.S. 1992. Field identification of 50 important timbers of India. ICFRE Publi. Dehradun 123 p.4. Sharma, L.C. 1977. Development of forests and forest based industries, Bishen Singh Mahendra Pal Singh, Dehradun. Trotter, H. 1940. Manual of Indian forest utilization. Oxford University Press, New Delhi.5. Trotter, H. 1982. Indian forest utilisation, Forest Research Institute and Colleges, Dehradun.**6.** Wadoo, M.S. 1992. Utilization of forest resources. Idris Publi. Srinagar 252 p. |
| **Mode of Examination** | Assignment/Quiz/Viva-Voce/student seminar/written examination/PPT |
| **Recommended By BOS on:** |  |
| **Approved by academic council on:** |  |
| **SC124** | **FERTILITY OF FOREST SOILS AND NUTRIENT MANAGEMENT**  |
| **Prerequisite**  | All students are expected to have a general knowledge of forest, soil and management principles. |
| **Learning objective**  | The learning objectives of course are: To create an understanding regarding the fertility of soil, To gain knowledge about nutrients requirement of forest, To have understanding about integrated nutrient management, Able to analyze soil fertility. |
| **Salient features**  | The student will be able to conceptualize about interrelationship between fertilizer and soil, Able to evaluate soil fertility. |
| **Utility** | A degree in forestry opens doors to job opportunities in science, industry and environmental management, Conservation and Resource Management, Forest Rangers, tree genetics and biotechnology, forestry technicians and forestry workers. |
| **Unit-I** | **Forest soils** |
| Forest soils – genesis – soil forming processes,Podsolisation and laterization – genetic soil groups of the word – upland, podzol – grood soils – melanized |
| **Unit- II** | **Types of Soil** |
| Laterite and lateritic, hydromophic and embryonic soils – clayey and organic soils – Nutrients – nutrient retention and distribution – diagnosis and correction of nutrient deficiencies. |
| **Unit-III** | **Fertilizers** |
| Fertilizers - manures – classification – macro, secondary and micronutrient Fertilizers. |
| **Unit-IV** | **Efficient use of fertilizers** |
| Reactions – method of applcation –recovery and residual effect of addedb fertilizers Efficient use of fertilizers- organic, inorganic and biofertilizers.. |
| **Unit-V** | **Integrated nutrient management** |
| Integrated nutrient management (INM). Soil fertility evaluation – approaches, concepts, and application. Effect of forest fire on soil properties – physical, chemical and biological – management practices |
| **Reference books** | 1. Biswas, T.D. and S.K. Mukherjee, 1992. Text book soil fertility. Tata Mc. Grew Hill, Publishning Co., New Delhi.2. Black, C.A. 1993. Soil fertility evaluation and control, Lewis publishers, London.3. Fertilizers 5th edition Macmillan Publishing Co., New York.4. Kanwar, J.S. 1976. Soil Fertility – Theory and practice ICAR publication, New Delhi.5. Mengel, K. and E.A.Kirkby. 1987. Principles of plant nutrition. 4th edition, IPI Switzerland.6. Tisdale, S.L., W.L.Nelson, J.D.Beaton and J.L.Havlin. 1995. Soil fertility and7. Wild, A. 1988. Soil conditions and plant growth. 11th edition, ELBS, London. |
| **Mode of Examination** | Assignment/Quiz/Viva-Voce/student seminar/written examination/PPT |
| **Recommended By BOS on:** |  |
| **Approved by academic council on:** |  |
| **SC 126** | **Agroforestry &Social Forestry**  |
| **Prerequisite**  | All students are expected to have a general knowledge of agriculture and management principles. |
| **Learning objective**  | The learning objectives of course are: To create an understanding regarding the Indian agriculture, To gain knowledge about financial and socio-economic analysis, To have understanding about classification of wastelands, Able to analyzewasteland management. |
| **Salient features**  | The student will be able to conceptualize about watershed management, Able to analyze management practice regarding wasteland management. |
| **Utility** | A degree in forestry opens doors to job opportunities in science, industry and environmental management, Conservation and Resource Management, Forest Rangers, tree genetics and biotechnology, forestry technicians and forestry workers. |
| **Unit-I** | **Indian agriculture** |
| Indian agriculture - its structure and constrants. Land use definition, classification and planning. Agroforestry - definition, aims, objectives and need. Traditional agroforestry systems: Taungyasystem,Shifting cultivation, windbreak, shelterbelts, Homestead gardens'. Alley cropping, high density short rotation plantation systems, silviculturalwoodlots/energy plantations. |
| **Unit- II** | **Classification of Agroforestry system** |
| Classification of Agroforestry system -structural, functional, socioeconomic and ecological basis. Multipurpose tree species and their characteristics. |
| **Unit-III** | **watershed management and climate change mitigation** |
| Tree architecture, canopy management - lopping, prunning, pollarding and hedging, Diagnosis and design. Agroforestry systems in different agroclimatic zones, components, production and management techniques. Nutrient cycling, soil conservation, watershed management and climate change mitigation, Economics of agroforestry systems. |
| **Unit-IV** | **Financial and socio-economic analysis of agroforestry** |
| People participation, rural entrepreneurship through agroforestry and industrial linkages. Analysis of fodder and fuel characteristics of tree/shrubs. Financial and socio-economic analysis of agroforestry systems,Social forestry in Uttar Pradesh, components targets and achievements. |
| **Unit-V** | **Wastelands** |
| Wastelands - definition, extent and classification suitable tree species for acid saline, sodic, lateritic calcareous sandy, shallow, water logged and mine spoiled soils methods of sand dune stabilization, Agroforestry for coastal and hilly areas. |
| **Reference books** | 1. Dwivedi, A.P. 1992. Agroforestry principles and practices. Oxford and IBH Publication Co., New Delhi.2. Nair, P.K.R. 1993. An introduction to agroforestry. Kluwer Academic Publishers. 499 p.3. Huxley, P. 1999. Tropical agroforestry. Blackwell Science, Oxford. 371 p.4. Khosla, P.K. and Khurana, D.K. 1987. Agroforestry for rural needs. Vol. 1 and II, ISTS, Solan, H.P.5. Ong, C.K. and Huxley, P.K. 1996. Tree crop interactions – A physiological approach. ICRAF, Kenya. 386 p.6. Ramakrishnan, P.S. 1992. Shifting agriculture and sustainable development. Man and biosphere series. The Parthenon Publishing Group. 424 p.7. Sen Sarma, P.K. and Jha, L.K. 1993. Agroforestry. Indian Perspectives. Ashish Publishers, Delhi.8. Singh, R.V. 1978. Fodder trees of India. Natraj Publishers, Dehradun.9. Tejwani, K.G. 1994. Agroforestory in India. Oxford and IBH Publ. Co., New Delhi. 233 p.10. Young, A. 1997. Agroforestry for soil management. CAB Intl. Wellingford.320p |
| **Mode of Examination** | Assignment/Quiz/Viva-Voce/student seminar/written examination/PPT |
| **Recommended By BOS on:** |  |
| **Approved by academic council on:** |  |

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| **SC128** | **Nursery Management & Seedling Management** |
| **Prerequisite**  | All students are expected to have a general knowledge of nursery, and management principles. |
| **Learning objective**  | The learning objective of course are: To create an understanding regarding the nursery, To gain knowledge about planning of nursery area, To have understanding about methods of seed sowing, Able to analyze seedling management. |
| **Salient features**  | The student will be able to conceptualize about nursery and seedling management, Able to analyze management practice regarding nursery management. |
| **Utility** | A degree in forestry opens doors to job opportunities in science, industry and environmental management, Conservation and Resource Management, Forest Rangers, tree genetics and biotechnology, forestry technicians and forestry workers. |
| **Unit-I** | **Planning and layout of nursery area** |
| Propagation concept, definition, methods and importance. Site selection, planning and layout of nursery area, Propagation concept, definition, methods and importance. Site selection, planning and layout of nursery area |
| **Unit- II** | **Types of nursery** |
| Types of nursery, types of nursery beds, preparation of beds. Presowingtreatments. |
| **Unit-III** | **Methods of seed sowing** |
| Methods of seed sowing. pricking. watering methods, weeding, hoeing, fertilization, shading, root culturing techniques, lifting windows, grading, packaging. Storing and transportation. Type and size of containers. Merits and demerits of containerized nursery. Preparation of ingredient mixture.  |
| **Unit-IV** | **Propagation techniques** |
| Vegetative propagation techniques - macro and micropropagation. |
| **Unit-V** | **Wastelands** |
| Wastelands - definition, extent and classification suitable tree species for acid saline, sodic, lateritic calcareous sandy, shallow, water logged and mine spoiled soils methods of sand dune stabilization, Agroforestry for coastal and hilly areas. |
| **Reference books** | 1. Kumar, V. 1999. Nursery and plantation practices in forestry. Scientific publication. Jodhpur. 531 2. Chaturvedi, A.N. 1994. Technology of forest nurseries, Khanna Bandhu, Dehradun.3. Duryea, M. L. and Landis, T.D. 1984. Forest nursery manual: Production of bare root seedlings. MartinusNijhoff. The Hague. 385 p.4. F.A.O.1978. Establishment techniques for plantations, F.A. O. Publication, Rome, Italy.5. Jackson, M.B. 1980. New root formation in plant and cuttings, MartinusNijhoff Publishers, The Netherlands.6. Kumar, V. 1999. Nursery and plantation practices in Forestry. Scientific Publication. Jodhpur. 53p7. Ram Prakash, Chaudhari, D.C. and Negi, S.S. 1998. Plantation and nursery techniques of forest trees. International book Distributors, Dehradun. 452p8. Willan, R.L. 1985. A guide to forest seed handling. F.A.O Rome, 379p. |
| **Mode of Examination** | Assignment/Quiz/Viva-Voce/student seminar/written examination/PPT |
| **Recommended By BOS on:** |  |
| **Approved by academic council on:** |  |

**SC 165 FOREST ENTOMOLOGY AND PEST MANAGEMENT Lab**

• Study of distinguishing characters of phylum Arthropoda

• Study of morphology, mouthparts and appendages of cockroach

• Study of different types of insects

• Study of immature stages of insects

• Study of Anatomy of cockroach

• Study of Insect collection, pinning, labelling and preservation

• Study of representatives of insect orders and families

• Study of predators and parasites

• Study of insecticides and their formulations, plant protection appliances

• Study of insect pests of forest seeds and forest nurseries

• Study of insect pests of standing trees, freshly felled trees and finished products

• Study of morphological characters of nematodes

• Extraction of plant parasitic nematodes

• Important symptoms of plant parasitic nematodes

• Visit to forest nurseries and plantations.

**SC 167 FOREST SOIL SURVEY, LAND USE & REMOTE SENSING**

Exercise on sampling methods; Exercises on land use classes; Exercises on lightspectral characteristics; Study of equipment and materials used in aerial photography and remote sensing; Study of scales; Case studies-aerial photography and satellite imageries; Case studies – Geographic Information System – application in forestry; Computer software

used in GIS; Analysis of soil for Gypsum and lime requirement; Exercises on study of eroded soils; Study on types of pits and trenches, tree species suitable for mined out areas; Visit to nearest mined areas.

**SC 169 Silviculture system of Indian TreesLab**

• Acquaintance with various technical terms.

• Visits to different forest areas/types.

• Study of forest composition.

• Recording the observations on shoot development, growth rings, crown

development, leafing, flowering and fruiting in a few selected tree species.

• Study of site factors like climatic, edaphic, physiographic and biotic.

• Study of forest succession.

• Study of the afforestation and reforestation success.

Study of species composition in surrounding areas. Study of morphology and phenology

of tree species growing in the area. Study of artificial regeneration of Pines, Bamboo, Oak, Dalbergiasisoo and Acacia catechu, etc. Practicing thinning in Bamboo clumps. Study on tree responses to the abiotic and biotic factors viz., light, fire, drought, frost, root suckering, coppicing and pollarding, etc. To study quality characters of nursery planting stock.

**SC 170 FOREST MANAGEMENT AND WORKING PLAN LAB**

• Visit to plantations of different age gradations, record the actual growing stock and workout increments.

• Visit to forests and enumerate the stock and test one of the methods for yield regulation.

• Study the various units adopted in the forest management.

• Study of various records and forms maintained in the office of the RFO with regard to management of forests under their control.

• Study of procedure for seizure of property.

• Visit to forest department and courts to observe penalty procedures.

• Preparation of first information report and enactment report.

• Study of working plans of the forests and to prepare the working plan for one of the area in the range.

• Estimation of MAI and CAI – Fixation of rotation for species.

• Preparation of working plan –field work – stock map and quality class map preparations

• Sample plots and collection of data by plot sampling and point sampling – writing working plan.

**SC 171 Agrometerology Lab**

• Study of temperature instruments, pressure instruments, humidity

instruments, wind instruments, rain instruments and wind rose.

• Solar radiation instruments with pyranometer.

• Monthly variation of rainfall at Allahabad

• Lay-out of an agromet observatory and types.

• Measurement of wind and evaporation.

• Measurement of sunshine hours.

• Measurement of soil temperature and dew.

**SC 172 WOOD ANATOMY AND TECHNOLOGY LAB**

• Study of primary growth in typical dicot stem.

• Study of vascular bundles in monocots

• Study of three dimensional features (cross, radial and tangential planes) of logs (woody trunks)

• Comparative anatomical features of softwoods and hardwoods

• Study of gross features of different types of wood- straight, interlocked, spiral and wavy grain; texture; lusture; etc.

• Study of anatomical features of different types of wood pores /vessels

• Study of soft tissues in timbers and their distribution

• Study of wood rays and their types

• Study of non-porous woods, their physical and anatomical description

• Study of cell inclusions in wood

**SC 174 FERTILITY OF FOREST SOILS AND NUTRIENT MANAGEMENT LAB**

• Estimation of pH and EC –Organic carbon

• Available N, P and K, Ca, Mg, S and micronutrients

• Analysis of fertilizers: Ammonium nitrate, -super phosphate, rock phosphate

• Muriate of potash – manure analysis

• Farm yard manure – Interpretation of soil and fertilizer analysis data for

fertilizer recommendation.

**SC 176 Agroforestry &social Forestry LAB**

• Study characteristics of trees/shrubs/grasses for agroforestry.

• Volume and biomass estimation.

• Crown measurement, light interception and moisture measurement in agroforestry systems.

• Annual crops/grass growth measurements and yield estimation.

• Analysis of soil and plant samples for organic carbon N,P and K.

• Diagnosis and design

• Methodology. Survey agroforestry practices in local/ adjoining areas.

• Description of intercropping, alley cropping and mixed woodlot systems

• Resource sharing efficiency of different tree species

• Allelopathic effect of different tree species

• Diagnostic survey in a nearby village

• Exercise in designing a shelterbelt

• Documentation and description of different fodder trees in the locality

• Recording components of a social forestry plantation

• Management prescriptions for Agave

• Assessment of people’s participation in social forestry project

• Detailed description of Agroforestry systems adopted in the Uttar Pradesh area – methodology for sand dune stabilization.

**SC 178 Nursery management &seedling managementLAB**

• Preparation of production and planning schedule for bareroot and containerized nurseries.

• Nursery site and bed preparation.

• Pre-sowing treatments.

• Sowing methods of small, medium and large sized seeds.

• Pricking and transplanting of pricked out stock within nursery in transplant beds.Intermediate nursery management operations.

• Preparation of ingredient mixture.

• Filling of containers.

• Study of vegetative techniques – cutting, grafting etc.

• Visit to tissue culture laboratory and other nurseries.