

KANNUR UNIVERSITY
(Abstract)

BSc Forestry - Revised Scheme & Syllabus of Core, Complementary and Open Courses under Choice Based Credit Semester System for Under Graduate Programme-implemented with effect from **2014 admission-Orders Issued.**

ACADEMIC BRANCH

No. Acad/C2/ 4554 /2014

Dated, Civil Station P.O, 03 - 05-2014

- Read: 1.U.O No. Acad/C2/2232/2014 dated 14-03-2014
2. Minutes of the meeting of the Board of Studies in Forestry held on 05-10-2013.
3. Minutes of the meeting of the Faculty Technology held 01-04-2014
4. Letter dated 03-03-2014 from the Chairman, BOS in Forestry (Cd)

ORDER

1. The Revised Regulations for UG Programme under Choice based Credit Semester System were implemented in this University with effect from 2014 admission as per paper read (1) above.
2. As per paper read (2) above the Board of Studies in Forestry (Cd) finalized the Scheme , Syllabus & model Question Papers for Core, Complementary & open courses of BSc Forestry programme to be implemented with effect from 2014 admission..
3. As per read (3) above the Faculty of Technology held on 01-04-2014 approved Scheme, syllabus & model question papers for core/complementary & open courses of BSc Forestry programme to be implemented with effect from 2014 admission.
4. The Chairman, Board of Studies in Forestry (Cd) vide paper read (4) above has submitted the finalized copy of Scheme, syllabus & Model question papers for core/complementary and open courses of BSc Forestry programme for implementation with effect from 2014 admission.
5. The Vice Chancellor, after examining the matter in detail, and in exercise of the powers of the Academic Council as per section 11(1) of Kannur University Act 1996 and all other enabling provisions read together with, has accorded sanction to implement the revised scheme, syllabus& model question papers of BSc Forestry Programme with effect from 2014 admission.
6. Orders, therefore, issued implementing the revised scheme, syllabus & model question papers for core, complementary& open courses of BSc Forestry programme under CBCSS with effect from 2014 admission subject to report to Academic Council
7. Implemented revised Syllabus is appended.

SD/-
DEPUTY REGISTRAR (ACADEMIC)
FOR REGISTRAR

To

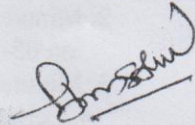
1. The Principals of Affiliated Colleges offering B.Sc Forestry Programme.
2. The Examination Branch (through PA to CE)

Contd.....2

Copy To:

1. The Chairman, BOS Forestry (Cd)
2. PS to VC/PA to PVC/PA to Registrar
3. DR/AR I Academic
4. Central Library
5. SF/DF/FC.

Forwarded / By Order



SECTION OFFICER

❖ For more details log on to www.kannur_university.ac.in

Payin
65.05.14



KANNUR UNIVERSITY

SCHEME AND SYLLABUS

FOR UNDERGRADUATE

PROGRAMME IN

FORESTRY

Choice Based Credit and Semester System

With effect from 2014 admission

CONTENTS

CHAPTER	TITLE	PAGES
I	GENERAL GUIDELINES	1 - 6
II	PROGRAMME STRUCTURE	7 - 8
III	COURSE SYLLABI	9 - 36
IV	SCHEME OF EXAMINATIONS AND MODEL QUESTION PAPERS	37 - 60
	APPENDICES	I to III

List of Tables

Table No.	Title	Page No.
1	Scheme of core and general courses	2
2	Scheme of Open Course for the 5 th semester	2
3	Credit distribution of BSc. Forestry programme	3
4	Scheme of mark distribution of BSc. Forestry programme	4

KANNUR UNIVERSITY
B.Sc. Forestry Programme
General Guidelines

B.Sc. Forestry, an undergraduate programme under the Faculty of Science of Kannur University, consists of Forestry as core subject with two complimentary subjects. The duration of the programme is six semesters distributed in a period of three years. A semester consists of 90 working days including examination days distributed over a minimum of 18 weeks of five working days each.

COURSES

The number of courses required to complete the programme shall be 37. 'Course' means a segment of subject matter to be covered in a semester (traditionally referred to as paper). The courses include Common Courses including General Course, Complimentary Course, Core Course and Open Course. The breakup of the courses is as follows;

Common courses (English + Additional language)	- 6
Common courses (General)	- 4
Complimentary I	- 5
Complimentary II	- 5
Core	- 16
Open Course	- 1
Total	37

'Common course' means a course that comes under the category of courses, including compulsory English and additional language courses and a set of general courses. There are 10 common courses for the BSc. Forestry programme. This includes four English courses (two courses each in first and second semesters), two additional language courses (one course each in first and second semesters) and four General courses (two each in third and fourth semesters). The syllabi of general courses include the topics related to forestry.

'Complimentary Course' means a course which is generally related to the core course (traditionally referred to as subsidiary paper). There are two complimentary subjects for BSc. Forestry programme. The total number of courses offered in each subjects shall be FIVE. Complimentary courses are offered during first to fourth semesters.

'Core course' means a compulsory course in a subject related to a particular degree programme. The core subject Forestry consists of 13 theory papers and 3 practical papers. The semester wise list of Core and General courses is given in Table 1.

'Open course' means a course which can be opted by a student at his/her choice. There shall be one open course in core subjects in the fifth semester. The open course shall be open to all the students in the institution except the students in the parent department. The students can opt for that course from any other department in the institution. Each department can decide the open course from a pool of three courses offered by the university. The list of open courses offered under BSc. Forestry programme is given in Table 2.

Table 1. SCHEME OF CORE AND GENERAL COURSES

Sl. No	Sem.	Course Code	Name of the Course	Hours /Week	Credit	Total Marks
1	I	1B01FOR	Forests, Forestry and Forest Meteorology	3	3	50
2	II	2B02FOR	Forest Ecology, Biodiversity and Conservation Biology	3	3	50
3	III	3B03FOR	Principles of Silviculture and Silvicultural Systems	3	3	50
4	III	3B04FOR	Agroforestry, Plantation Forestry and Social Forestry	3	3	50
5	III	3A11FOR	Dendrology and Tree Physiology	3	4	50
6	III	3A12FOR	Anatomy, Structure and Properties of Wood	3	4	50
7	III	4B06FOR	Core Practical – I *	3	-	-
8	IV	4A13FOR	Practices of Silviculture, Silviculture of Indian trees and Forest Seed Technology	3	4	50
9	IV	4A14FOR	Soil Science and Watershed Management	3	4	50
10	IV	4B05FOR	Wood Degradation, Wood Seasoning and Wood Preservation	3	3	50
11	IV	4B06FOR	Core Practical – I	6	4	60
12	V	5B07FOR	Wood Processing, Manufacturing of Wood Products and Wood Based Industries	3	3	50
13	V	5B08FOR	Forest Economics and Forest Statistics	5	3	50
14	V	5B09FOR	Forest Mensuration, Forest Survey and Remote Sensing	5	3	50
15	V	5B10FOR	Forest Management and Utilization	4	3	50
16	V	5B11FOR	Core Practical – II **	6	4	60
17	V	5B12FOR	Forestry Field Experience ***	-	2	20
18	VI	6B13FOR	Forest Entomology, Forest Pathology and Forest Protection	4	3	50
19	VI	6B14FOR	Ecotourism, Urban Forestry and Landscape Management	4	3	50
20	VI	6B15FOR	Forest Genetics, Tree Improvement and Biotechnology	5	3	50
21	VI	6B16FOR	Wildlife Science and Human Dimensions	6	4	50
22	VI	6B17FOR	Core Practical – III	6	4	60
23	VI	6B18FOR	Project	-	2	25

* Forest Meteorology, Forest Ecology, Biodiversity, Dendrology, Tree Physiology, Anatomy, Structure and Properties of Wood (External exam in 4th semester), ** External exam in 6th semester, *** Evaluation at the end of 6th semester.

Table 2. Scheme of OPEN COURSES for 5th Semester

Sl. No.	Course Code	Name of the Course	Hours /Week	Credit	Total Marks
1	5D01FOR	Ecotourism	2	2	25
2	5D02FOR	Biodiversity Conservation	2	2	25
3	5D03FOR	Landscaping and Ornamental Gardening	2	2	25

COURSECODE

Each course shall have a unique alphanumeric code number, which includes the semester number (1 to 6) in which the course is offered, the code of the courses A to D viz., Common Courses (Code A), Core courses (Code B), Complementary courses (Code C) and Open course (Code D), the serial number of the course (01, 02.....) and abbreviation of the subject in three letters ('FOR' for forestry). For example, 2B02FOR represents second semester Core course 2 in Forestry.

CREDITS

Each course shall have certain credits. For passing the BSc. Forestry programme the student shall be required to achieve a minimum of 120 credits of which 38 credits (14 credits for English courses, 8 credits for Additional language courses and 16 credits for General courses) shall be from common courses. Minimum credits required for core, complementary and open courses put together are 82. The distribution of credits for various courses is given in Table 3.

Table 3. Credit distribution of BSc. Forestry programme

Subject	Sem.	Common							
		English	Addl. Lang.	General					
Forestry	I	4 +3	4		3	2	2		18
	II	4 +3	4		3	2	2		18
	III			4+4	3+3	2	2		18
	IV			4+4	3+4	4+2	4+2		27
	V				3+3+3+3+4+2			2	20
	VI				3+3+3+4+4+2				19
	Total		14	8	16	56	12	12	2

ATTENDANCE

Minimum 75% attendance is compulsory for theory as well as practical courses, failing which a student is not eligible to appear for university examinations.

SEMINARS/ASSIGNMENTS

These are part of the curriculum and are to be critically assessed for Internal Assessment. Marks should be awarded based on the content, presentation and the effort put in by the student. The course teacher may give the topics for seminars / assignments. The topics shall be related to the syllabus of the course and is not meant for evaluation in the End Semester Examination. The format of the title page of assignment /seminar report is given in Appendix I

PROJECTWORK

Every student of B.Sc. Forestry Programme shall have to work on a project of two credits under the supervision of a faculty member as per the curriculum. The duration of the project is one year, starting in the fifth semester and submission of the dissertation at the end of sixth semester. Individual projects

are recommended but in an instance where the number of supervising teachers is less, the project may be done as group. The maximum number of students in a group shall be limited to FIVE. The format of the title page of Dissertation is given in Appendix II

FORESTRYFIELD EXPERIENCE

Each student shall undergo field training in forestry under the supervision of a faculty member as per the curriculum in fifth semester. They should visit the areas mentioned in the syllabus and should carry out field works assigned to them by the course teacher. Every student shall maintain a Field Diary to record the observations, field data and other relevant information. Each student shall submit a Report based on his/her Field Diary. The Report, certified by the supervising teacher, may be valued by the external examiner appointed. The format of the title page of the Report is given in Appendix III

RECORDS

A record is compulsory for each practical course. The student will not be permitted to appear for practical examinations without certified practical records. The records are intended as observation records of the practical works done in the lab as well as in the field. The valuation of records, to be done internally, should be based on the effort and promptness of the student in practical works.

COURSE EVALUATION

The evaluation scheme for each course shall contain two parts

- a) Internal Assessment (IA)
- b) External Evaluation (End Semester Evaluation ESE)

20% weight shall be given to the internal evaluation. The remaining 80% weight shall be for the external evaluation. The distribution of marks for each course is given in Table 4.

Table 4. Scheme of mark distribution of BSc. Forestry programme

Courses		No. of courses	Marks per course			Total Marks
			Int.	Ext.	Total (Int+Ext)	
Common	English	4	10	40	50	200
	Addl. Language	2	10	40	50	100
General		4	10	40	50	200
Complementary	I (Botany)	5	8	32	40	200
	II (Chemistry)	5	8	32	40	200
Core	Theory	13	10	40	50	650
	Practical	3	12	48	60	180
	Project	-	5	20	25	25
	Forestry Field Experience	-	4	16	20	20
Open course		1	5	20	25	25
Total						1800

Internal Assessment: 20% of the total marks in each course are for internal assessment. The marks secured for internal assessment only need be sent to university by the colleges concerned. The internal assessment shall be based on a predetermined transparent system involving written test, assignments/ seminars/ Viva and attendance in respect of theory courses and submissions and records, tests and attendance in respect of practical courses. Components with percentage of marks of Internal Evaluation of Theory Courses are-

Attendance	- 25%
Assignment/ Seminar/Viva	- 25%
Test paper	- 50%

For practical courses-

Attendance	- 25%
Submissions and Record	- 50%
Practical Test Paper	- 25%

(If a fraction appears in total internal marks, nearest whole number is to be taken)

Attendance of each course shall be evaluated as below-

Attendance %	% Marks Allotted
Above 90%	100%
85 to 89%	80%
80 to 84 %	60%
76 to 79 %	40%
Less than 75 %	20%

External Evaluation: External evaluation carries 80% of marks. All question papers shall be set by the university. The external examination in theory courses is to be conducted with question papers set by external experts. The evaluation of the answer scripts shall be done by examiners based on a well-defined Scheme of valuation and answer keys provided by the University. The external examination in practical courses shall be conducted by two examiners - one internal and an external appointed by the University. No practical examination will be conducted in odd semester. Practical examinations shall be conducted in the even semester (II, IV and VI). The Scheme of Examinations and Model Question Papers of all the theory and practical courses offered under core, general and open courses are given in Chapter IV.

ProjectEvaluation

Evaluation of the Project Work shall be done under Mark System at two stages:

- a) Internal Assessment (supervising teachers will assess the project and award internal Marks)
- b) External evaluation (external examiner appointed by the University)

Marks secured for the project will be awarded to candidates, combining the internal and external Marks. The internal to external components is to be taken in the ratio 1:4. Assessment of different components may be taken as below.

Internal (20% of the total)		
Components	% of Marks	Marks
Punctuality	20	1
Collection/Use of Data	20	1
Project Report	30	1.5
Presentation & Viva	30	1.5
Total	100	5

External (80% of Total)		
Components	% of Marks	Marks
Relevance of the Topic, Statement of objectives, Methodology, Reference	25	5
Quality of Analysis/Use of statistical tools, Findings and Recommendations	25	5
Viva-Voce	50	10
Total	100	20

External Examiners will be appointed by the University from the list of VI semester Board of Examiners in consultation with the Chairperson of the Board. Project evaluation shall be done along with the external examination of Core Practical III in sixth semester.

Pass Conditions: Submission of the Dissertation and presence of the student for viva are compulsory for the evaluation. No marks shall be awarded to a candidate if she/he fails to submit the Dissertation for external evaluation. The student should get a minimum of 40 % marks for pass in the project. There shall be no improvement chance for the Marks obtained in the Project Report. In an instance of inability of obtaining a minimum of 40% marks, the project work may be re-done and the report may be re-submitted along with subsequent exams through parent department.

Evaluation of Forestry Field Experience

Evaluation of Forestry Field Experience shall be done under Mark System at two stages. Internal Assessment by the supervising teacher and External Evaluation by the examiner appointed by the University. The internal to external components is to be taken in the ratio 1:4. Assessment of different components may be taken as below.

Internal (20% of the total)		
Components	% of Marks	Marks
Punctuality	50	2
Field Diary	50	2
Total	100	4

External (80% of Total)		
Components	% of Marks	Marks
Report	70	10
Viva-voce	30	6
Total	100	16

External evaluation shall be done along with the practical examination of Core Practical II in sixth semester. The External Examiner appointed for the examination of Core Practical II in 6th semester may be assigned for external evaluation in consultation with the Chairperson of the Board of Examiners

Pass Conditions: Submission of the Field Diary, Report and presence of the student for viva are compulsory for the evaluation. No marks shall be awarded to a candidate if she/he fails to submit the Report for external evaluation. The student should get a minimum of 40% marks for pass in Forestry Field Experience, and there shall be no improvement chance for the Marks obtained. In an instance of inability of obtaining a minimum of 40% marks, the field works may be re-done and the report may be re-submitted along with subsequent exams through parent department.

PROGRAMME STRUCTURE (B.Sc. Forestry)

SEMESTER 1

No.	Course	Credits	Hours/ Week	Total Marks
1	Common Course (English)	4	5	50
2	Common Course (English)	3	4	50
3	Common Course (Additional Language)	4	5	50
4	Core Course I (1B01FOR)	3	3	50
5	Complementary Course I	2	4	40
6	Complementary Course II	2	4	40
Total		18	25	280

SEMESTER 2

No.	Course	Credits	Hours/ Week	Total Marks
1	Common Course (English)	4	5	50
2	Common Course (English)	3	4	50
3	Common Course (Additional Language)	4	5	50
4	Core Course II (2B02FOR)	3	3	50
5	Complementary Course I	2	4	40
6	Complementary Course II	2	4	40
Total		18	25	280

SEMESTER 3

No.	Course	Credits	Hours/ Week	Total Marks
1	General Course (3A11FOR)	4	3	50
2	General Course (3A12FOR)	4	3	50
3	Core Course III (3B03FOR)	3	3	50
4	Core Course IV (3B04FOR)	3	3	50
5	Core Practical – I (4B06FOR)*	-	3	-
6	Complementary Course I	2	5	40
7	Complementary Course II	2	5	40
Total		18	25	280

* - External exam in 4th semester

SEMESTER 4

No.	Course	Credits	Hours/ Week	Total Marks
1	General Course (4A13FOR)	4	3	50
2	General Course (4A14FOR)	4	3	50
4	Core Course V (4B05FOR)	3	3	50
5	Core Practical – I (4B06FOR)	4	6	60
6	Complementary Course I	2	5	40
7	Complementary Course I – Practical	4	-	40
8	Complementary Course II	2	5	40
9	Complementary Course II – Practical	4	-	40
Total		27	25	370

SEMESTER 5

No.	Course	Credits	Hours/ Week	Total Marks
1	Core Course VI (5B07FOR)	3	3	50
2	Core Course VII (5B08FOR)	3	5	50
3	Core Course VIII (5B09FOR)	3	5	50
4	Core Course IX (5B10FOR)	3	4	50
5	Core Practical - II (5B11FOR)*	4	6	60
6	Forestry Field Experience (5B12FOR)**	2	-	20
7	Open Course	2	2	25
Total		20	25	305

* - External exam in 6th semester, ** - External evaluation in 6th semester

SEMESTER 6

No.	Course	Credits	Hours/ Week	Total Marks
1	Core Course X (6B13FOR)	3	4	50
2	Core Course XI (6B14FOR)	3	4	50
3	Core Course XII (6B15FOR)	3	5	50
4	Core Course XIII (6B16FOR)	4	6	50
5	Core Practical – III (6B17FOR)	4	6	60
6	Project (6B18FOR)	2	-	25
Total		19	25	285

FORESTS AND FORESTRY**Module I (10 Hrs)**

Biomes of the world – biotic and abiotic characteristics of Tundra, Temperate Coniferous Forests, Deciduous Forests, Tropical Rain Forests, Grasslands, Deserts and water biomes. Comparison between Temperate and Tropical Forests. Forest – various definitions. Classification of forests – based on method of regeneration, age, composition, objects of management, growing stock, ownership and legal status.

Module II (10 Hrs)

Forestry – definition, history and development of Indian Forestry. Branches of Forestry and their relationships. Forest types in India and Kerala – systems of classification - Champion & Seth revised classification. Distribution, species composition and characteristic features of evergreen forests, deciduous forests, shola forests, mangroves and myristica swamp forests with special reference to Kerala. Western Ghats – natural history and significance.

Module III (10 Hrs)

State of the forests – global, Indian and Kerala scenario. Important role of forests – productive, protective, regulatory and recreational roles. Global climate change – role of trees and forests in mitigation. Carbon sequestration – forests as carbon sinks. Threats to forests – anthropogenic and commercial threats (deforestation, fragmentation, encroachment, poaching, illegal felling and mining).

FOREST METEOROLOGY**Module IV (14 Hrs)**

Meteorology – definition, importance, scope and branches. Concepts of weather and climate. Scales of climate -macro, meso and micro climate. Atmosphere – composition, stratification and significance of ozone. Basic knowledge on latitude, longitude, altitude, albedo, solstice, equinox, aphelion and perihelion. Meteorological elements– Temperature – lapse rate, Solar radiation – effect on plants, radiation balance, Pressure, Wind, Humidity, Precipitations – types and forms, Evapotranspiration. Cloud types and their indications. Weather forecasting.

Suggested Readings

- Khanna, L.S. 1989. *Principles and Practice of Silviculture*. Khanna Bandhu, Dehra Dun. 473 p
- Raj, A. J. and Lal S. B. 2013. *Forestry – Principles and Applications*. Scientific Publishers, New Delhi
- Agarwal, W.P. *Forests in India*. Oxford and I.B.H
- Paul, L. *Tropical forestry Hand Book*. Springer Verlag Publications New York (2Vol)
- S. A. Sha. *Forestry for people*. ICAR, New Delhi
- Kishwan, J., Pandey, D., Goyal A. K. and Guptha A. K. 2007. *India's Forests*. MoEF. New Delhi
- State of the Forest Reports. Forest Survey of India, MoEF, Govt. of India
- P.R. Sinha, V.B. Mathur and B. C. Sinha. 2009. *India's Green Book*. Wildlife Institute of India
- Mather, A.S. 1990. *Global forest resources*. Belhaven, London
- Persson, R. 1992. *World forest resources*. Periodical experts, New Delhi.

Ghadekar, S.R. 2003. Meteorology . Agromet Publishers, Nagpur
Rao, GSLHVP. 2003. Agrometeorology, KAU, Thrissur, Kerala,
Varshney, M.C. and Pillai, P.B. 2003. Textbook of Agrometeorology. ICAR , New Delhi

2B02FOR - FOREST ECOLOGY, BIODIVERSITY AND CONSERVATION BIOLOGY

Credit: 3

Hours/Week: 3

FOREST ECOLOGY

Module I (14 Hrs)

Ecology – definition, history and development of ecology as science discipline. Basic concepts of ecology - levels of biological organization – abiotic and biotic components and their interaction. Trophic levels, food chains, ecological pyramids and energy flow. Ecosystems: classification and distribution. Population ecology, population dynamics and carrying capacity. Community ecology, characteristics of a biotic community – qualitative and quantitative characteristics, species interactions, ecotone and edge effect. Ecological succession.

Module II (10 Hrs)

Forest Ecology – Forest ecosystem, structure and dynamics. Forest as a biotic community. Horizontal and vertical stratification. Formation of forest communities – consociation and association. Forest succession and climax vegetation types. Succession theories. Productivity of forests. Forest biomass and its estimation.

BIODIVERSITY

Module III (15 Hrs)

Biodiversity – Definition, history and development. Convention on Biological Diversity (CBD). Levels of biodiversity. Uses and values of biodiversity – economic, ecological, cultural, scientific and educational values. Spatial classification of biodiversity – Alpha, Beta and Gamma diversity. Measures of diversity and diversity indices. India as a mega biodiversity nation. Biogeographic zones of India and world. Threats to biodiversity. Biological Diversity Act 2002. National Biodiversity Authority and State Biodiversity Boards. Peoples Biodiversity Register and Traditional Knowledge. Intellectual Property Rights – categories. Geographical Indication (GI) products from Kerala.

CONSERVATION BIOLOGY

Module IV (15 Hrs)

Conservation Biology - Principles of conservation biology. Ethics in conservation. Endemism – rarity and extinction of species – causes of extinction. Population density and inbreeding – genetic drift. Theory of Island Biogeography. IUCN redlist categories and criteria. *Ex situ* and *In situ* methods of conservation. Protected areas – concept and design. Protected area network in India and in Kerala - National Parks, Wildlife Sanctuaries, Community Reserves and Conservation Reserves. Conservation efforts - Worldwide and in India. Biosphere Reserves. Major conservation projects. Captive breeding programmes, introduction and reintroduction – case studies.

Suggested Readings

- Mishra, R. Ecology Work Book. Oxford and IBH Publishing Co, Calcutta.
- Odum, E.P. 1983. Basic Ecology. Saunders College Publishing, Holt Saunders, Japan
- Odum, E.P. Fundamentals of Ecology. Natraj Publisher, Dehradun
- Lal J. B. Forest Ecology. Natraj Publishers, Dehra Dun
- Misra KC. Manual of Plant Ecology. Oxford & IBH Pub Co. New Delhi etc. 491p
- Michael P. Ecological Methods for Field and Laboratory Investigations. Tata McGraw-Hill Pub. Co. New Delhi, 404p
- Frankel, O.H., Brown, A.H.D., Burdon, J.J. 1995. The Conservation of Plant Biodiversity. Cambridge University Press. Cambridge. 299p
- Negi, S.S. 1993. Biodiversity and its Conservation in India. India Publishing company, New Delhi
- Saggwal, S.S. 1995. Forest Ecology of India. Pioneer Publishers, India. 368p
- Arvind Kumar. Biodiversity and environment. A.P.M. Publishing Corporation, New Delhi.
- Kumar and Asija. Biodiversity – Principles and conservation. Updesh Purohit, Agrobios, Jodhpur
- Singh, V. Forest environment and biodiversity. Daya Publishing House, Delhi
- Tewari, D.N. Biodiversity and forest genetic resources. Published by International Book Distributions, Dehra Dun.
- Kovacs, M. 1995. Pollution Control and Conservation. Ellis Horwood Ltd., Chichester. 398p
- Sinha, B.N. 1990. Eco-system Degradation in India. Ashish Publishing House, New Delhi
- Hunter L Malcom. 1996. Conservation Biology. Blackwell Science. Chicago

3B03FOR - PRINCIPLES OF SILVICULTURE AND SILVICULTURAL SYSTEMS

Credit: 3

Hours/Week: 3

PRINCIPLES OF SILVICULTURE

Module I

(8 Hrs)

Definition of silvics and silviculture. Objectives and scope of silviculture. Growth and development of trees - height growth, diameter growth, volume growth. Growth in even aged forest. Growth in uneven aged forest.

Module II

(15 Hrs)

Factors of locality - climatic factors, topographic factors, edaphic factors, biotic factors. Classification of climatic factors. Role played by solar radiation, light, temperature, moisture, wind, snow, humidity and evaporation in relation to forest vegetation. Topographic factors - configuration of land surface, altitude, slope, aspect and exposure. Edaphic factors - physical and chemical properties of soil, mineral nutrients, nutrient cycling, soil moisture and their influence on forest production.

Module III

(7 Hrs)

Biotic factor-influence of plants, insects, wild animals, man and domestic animals on forest vegetation. Impacts of controlled burning and grazing. Site quality – evaluation. Site index. Stand density - density indices.

SILVICULTURAL SYSTEMS

Module IV

(24 Hrs)

Silvicultural system -definition, scope, classification and detailed study of the following systems: Clear felling system (including clear strip and alternate strip system); Shelter wood system; uniform system; the group system; the shelterwood strip system; the wedge system; the strip and group systems, the

irregular shelter wood systems; selection systems, group selection system, Accessory systems- two storied high forest system, high forest with reserve system, improvement felling, simple coppice system, the coppice with two rotation system; coppice with standard system; coppice with reserve system; coppice selection system and pollard system, culm selection system in bamboo.

Suggested Readings

Khanna, L.S.1989. *Principles and Practice of Silviculture*. Khanna Bandhu, Dehra Dun. 473 p
Negi, S. S. 1983. *General Silviculture*. Bishen Singh Mahendra Pal Singh, Dehradun. 96 p
Lamprecht, 1986. *Silviculture in the Tropics*. Verlag Paul Parey, Hamburg und Berlin. 296 p
Dwivedi, A. P. 2006. *A text book of Silviculture*. International Book Distributors. 505 p
Ramprakash and Khanna, L.S. 1991. *Theory and Practice of Silvicultural systems*. International book Distributors. 298p

3B04FOR - AGROFORESTRY, PLANTATION FORESTRY AND SOCIAL FORESTRY

Credit: 3

Hours/Week: 3

AGROFORESTRY

Module I

(10 Hrs)

Indian agriculture - its structure and constraints, land use planning. Agroforestry: definition and objective. Different agroforestry systems and its classification - structural, functional, socio-economic and ecological classification. Silvoagriculture systems – shifting cultivation, Taungya, growing agricultural crops in combination with commercial trees, plantation agriculture and plantation forestry. Agrosilviculture systems – trees in agricultural fields, alley cropping, trees on farm boundaries, commercial crops under shade of planted trees as well as natural forest. Pastoral silvicultural systems – grassland and tree management in the humid, arid and semi arid regions. Silvopastoral system – protein bank. Agrosilvopastoral system – home garden, shelter belts, windbreaks. Multipurpose tree gardens.

Module II

(8 Hrs)

Tree crop interaction – positive and negative interactions – commensalistic, ammensalistic, monophytic and inhibitory. Multipurpose trees species, desirable characters of trees in agroforestry. Management of trees in agroforestry. Advantages and disadvantages of agroforestry systems

PLANTATION FORESTRY

Module III

(9 Hrs)

Plantation Forestry – Definition and scope. Plantation forests - planting plan, plantation records, maps. Choice of species - concept of fast growth - exotics vs. indigenous. Traditional vs. intensive forest management. Plantation establishment - boundary demarcation, marking and felling, soil and planting map, fencing, staking, soil preparation, types of pit, seed sowing, planting - season of planting, methods of planting-stump planting-advantages, patterns of planting, irrigation, fertilizer application, beating up, nurse crop, cover crop.

Module IV

(9 Hrs)

Plantation maintenance - tending operations - importance, tending v/s cultural operations, weeding, cleaning, thinning - kinds of thinning, improvement felling, girdling, pruning, bud pruning, climber control. Plantation journal. Constraints in plantation forestry. Industrial plantations - paper and pulp

wood, match wood plantation - plywood plantation, MFP plantation. Energy plantation - high density short rotation plantations. Strip plantation - road side, canal and railway line plantations. Clonal plantations.

SOCIAL FORESTRY

Module V (9 Hrs)

Social forestry - Definition, concept, and objectives. Social forestry in the National Forest Policies of India. Species for social forestry. Classification of social forestry – farm forestry, extension forestry and village forestry. Role of social forestry to meet the demands for small timber, firewood, fodder and fibre of rural and urban people. Organizations involved in social forestry programme – case studies from Kerala.

Module VI (9 Hrs)

Forestry Extension Education – concept, scope and principles. People's participation in forestry extension programmes – community forestry and participatory forestry. Participatory Rural Appraisal – techniques.

Wastelands - definition, extent and classification. Afforestation on different ecological systems. Suitable tree species for acid, saline, sodic, lateritic, calcareous, sandy, shallow, water logged and mine spoiled soils.

Suggested Readings

- Nair, P.K.R. 1993. An introduction to agroforestry. Kluwer Academic Publishers. 499 p.
- Young, A. 1997. Agroforestry for soil management. CAB Intl. Wellingford. 320p
- Dwivedi, A.P. 1992. Agroforestry principles and practices. Oxford and IBH Publication Co.
- Sen Sarma, P.K. and Jha, L.K. 1993. Agroforestry. Indian Perspectives. Ashish Publishers, Delhi
- Anilkumar and Pandey, RN 1989. Wastelands Management in India. Ashish Publishing House
- Negi, S. S. 1986. A Handbook of Social forestry. International Book Distributors, Dehra Dun, 178p
- Prasad, V. N. 1985. Principles and Practices of Social-Cum-Community Forestry. International Book Distributors, Dehradun, 108p
- Shah, S. A. 1988. Forestry for People. ICAR, New Delhi, 147p
- Sharma SC, Chaturvedi RB and Mishra OP 1990. Utilization of Wastelands for Sustainable Development In India. Concept Publishing Co. New Delhi-59, 488p
- Evans, J. 1992. Plantation Forestry in the Tropics, 2nd edition. Oxford, UK, Clarendon Press.
- Suzuki, K., Ishii, K., Sakurai, S. and Sasaki, S. 2006. Plantation Forestry in the Tropics. Springer Tokyo.
- Luna R. K. Plantation Trees. International Book Distributors, Dehra Dun

3A11FOR – DENDROLOGY AND TREE PHYSIOLOGY

Credit: 4

Hours/Week: 3

DENDROLOGY

Module I (12 Hrs)

Definition and Scope of Dendrology. Systems of classification- natural, artificial and phylogenetic classification. Bentham and Hooker classification. Plant nomenclature - objectives and principles of

ICBN. Keys - Indented and bracketed keys, Herbaria - preparation of herbaria. Molecular taxonomy (brief account only). Role of vegetative morphology in the identification of trees - bole, bark, blaze, exudations, leaves and glands.

Module II

(12 Hrs)

Study of following families - systematic position, diagnostic features, floral formula, economic importance and important members of:

Magnoliaceae	Coniferae	Sapotaceae
Annonaceae	Palmae	Apocynaceae
Guttiferae	Sapindaceae	Bignoniaceae
Dipterocarpaceae	Anacardiaceae	Verbenaceae
Malvaceae	Leguminosae	Moraceae
Sterculiaceae	Rhizophoraceae	Euphorbiaceae
Rutaceae	Myrtaceae	Santalaceae
Meliaceae	Rubiaceae	Casuarinaceae

TREEPHYSIOLOGY

Module III

(15 Hrs)

Cell organelles and their physiological functions - cell wall, cell membrane, cytoplasm, cell inclusions like chloroplast, mitochondria. Tree structure, growth, development, differentiation and reproduction. Plant growth functions and growth kinetics. Environmental effects on growth and development. Plant water relations - role of water in plants - water potential - Mechanism of water uptake by roots, movement of water in plants, water loss from plants. Energy balance in plants. Transpiration, factors influencing transpiration rate. Stomata, structure, function - Mechanism of stomatal movement, antitranspirants.

Module IV

(15 Hrs)

Photosynthesis and bioproductivity. Photochemical process- Chloroplast, its structure, CAM plants and their significance. Rubisco structure and regulations, Photorespiration and its significance, CO₂ fixation, effect of environmental factors on photosynthetic rates. Translocations of photosynthates. Respiration and its pathways. Physiological aspects of micro and macro nutrients and mechanisms of nutrient uptake. Plant growth substances: Auxins, Gibberellins, Cytokinins, Ethylene, ABA and other phenolic compounds and physiological significance. Stress physiology - abiotic stresses, its effect, avoidance and tolerance mechanisms - drought, high temperature, chilling and salinity.

Suggested Readings

- Sambamurthy, A. V. S. S. 2005. *Taxonomy of Angiosperms*. I.K International Pvt. Ltd. 892 p.
- Jeffrey, C. 1982. *An Introduction to plant taxonomy*. Allied publishers. 154p.
- Henry, A. N. and Chandrabose, M. 1980. *An Aid to the International Code of Botanical Nomenclature*. Today and Tomorrow printers and publishers. 100p.
- Johri, R. M and Sneha Lata. 2005. *Taxonomy- 1 (Systematics and Morphology)*. Sonali Publications. 340 p
- Johri, R. M and Sneha Lata. 2005. *Taxonomy- 2 (Polypetalae)*. Sonali Publications. 300 p
- Johri, R. M and Sneha Lata. 2005. *Taxonomy- 3 (Gamopetalae)*. Sonali Publications. 190 p

- Johri, R. M and Sneh Lata. 2005. *Taxonomy- 4 (Monochlamydeae and monocotyledonae)*. Sonali Publications. 291 p
- Sasidharan, N. *Forest trees of Kerala*. KFRI, 169 p
- Dasgupta, S. 1998. *Systematic botany for foresters*. Khanna Bhandhu Publications, 210p.
- Kozlowski TT. 1971. *Growth and Development of Trees*. Vol. I. Academic Press.
- Kramer PJ and Kozlowski TT. 1979. *Physiology of Woody Plants*. Academic Press. Larcher W. 1980. *Physiological Plant Ecology*. Springer-Verlag.
- Raghavendra AS. 1991. *Physiology of Trees*. John Wiley & Sons.
- Taiz, L. and Zeiger, E. 2007. *Plant Physiology* 4th Ed. Sinauer Associates Inc. Publishers, Sunderland.

3A12FOR - ANATOMY, STRUCTURE AND PROPERTIES OF WOOD

Credit: 4

Hours/Week: 3

ANATOMY AND STRUCTURE OF WOOD

Module I (12 Hrs)

Classification of woody plants. The plant body - a tree and its various parts. Cells, tissues and tissue systems of vascular plants- secondary growth in plants-mechanism of wood formation. Anticlinal and Periclinal division. Ray initials and fusiform initials. Physiological significance of wood formation.

Module II (12 Hrs)

The macroscopic features of wood - sapwood, heartwood, pith, early wood, late wood, growth rings, wood rays, planes of surfaces. Microscopic features of wood - tracheids, vessels, fibers, parenchyma and rays, simple pits and bordered pits. Impregnation and infiltrations in wood - resin canals, gum-canals, latex canals, silica, calcium salts etc.

Module III (12 Hrs)

Three dimensional features of wood; transverse, tangential and radial surfaces. Elements and structure of wood cell wall. Juvenile wood and mature wood. Abnormalities in wood - deviation from typical growth form - Grain deviation, false and discontinuous growth rings. Reaction wood. Disruption of continuity of inner wood, shakes, included bark, resin pockets, pith flecks, knots - live and dead knots.

PROPERTIES OF WOOD

Module IV (18 Hrs)

Physical properties of wood - colour, hardness, weight, texture, grain and lusture. Electrical – conductivity, resistivity, dielectric constant. Thermal and acoustic properties of wood. Mechanical properties of wood like tension, compression, bending, shearing, cleavage, hardness, impact resistance, nail and screw holding capacities. Suitability of wood for various end-uses - based on mechanical and physical properties. Merits and demerits of wood as raw material. Wood specific gravity and its significance.

Suggested Readings

- David N-S Hon and Nobuo Shiraishi. 2000. *Wood and Cellulosic Chemistry* (second edition). Marcel Dekker.

A hand book of Kerala timbers K.F.R.I Trichur Kerala.
Franze F.P Kollman and Wilfred A Coles. Principles of wood science and Technology Vol I & II Springer Verlag, Berlin.
Higuchi, T. 1997. Biochemistry and Molecular Biology of Wood. Springer, 362p.
Indian Forest Utilization. Vol I and II. Forest Research Institute Dehra Dun.
Mehta, T. 1981. A handbook of Forest Utilization. IBD Dehra Dun.

4A13FOR - PRACTICES OF SILVICULTURE, SILVICULTURE OF INDIAN TREES AND FOREST SEED TECHNOLOGY

Credit: 4

Hours/Week: 3

PRACTICES OF SILVICULTURE

Module I (12 Hrs)

Regeneration of forests – Natural regeneration from seed. Natural regeneration under various silvicultural systems - clear felling, shelter wood and selection systems. Natural regeneration from vegetative parts - advantages and methods of vegetative propagation. Natural regeneration by coppice - factors affecting. Natural regeneration by root suckers. Other operations of vegetative growth. Natural regeneration supplemented by artificial regeneration.

Module II (8 Hrs)

Artificial regeneration – objectives - essential considerations - organization of plantation work. Nursery – importance and classification. Establishment of nursery - site selection, layout, area requirement, nursery bed, medium, containers, water budgeting, grading, hardening of seedlings and nursery register.

SILVICULTURE OF INDIAN TREES

Module III (10 Hrs)

General description, phenology, silvicultural characters, regeneration methods, silvicultural systems, and economic importance of the following tree species: *Tectona grandis*, *Shorea robusta*, *Dalbergia latifolia*, *Dalbergia sissoo*, *Terminalia* spp., *Santalum album*, *Swietenia macrophylla*, *Albizia* spp, *Pterocarpus santalinus*, *Azadirachta indica*, *Dendrocalamus strictus*, *Eucalyptus* spp, *Casuarina equisetifolia*, *Leucaena leucocephala*, *Acacia* spp, *Populus* spp, *Cedrus deodara*, *Pinus roxburghii*, *Pinus wallichiana*.

FOREST SEED TECHNOLOGY

Module IV (12 Hrs)

Reproductive biology in plants. Seed development and maturation. Seed structure. Seed dispersal. Seed germination – types - steps in germination, factors affecting, stimulators and inhibitors. Seed collection - indices of maturity, methods of collection, seed production areas and seed orchards, seed bearing years. Major classes of seeds - orthodox and recalcitrant. Fruit and seed handling between collection and processing, maintaining viability and identity, special precautions for recalcitrant seeds. Seed extraction - drying, tumbling, dewinging, dry extraction, wet extraction and for recalcitrant seeds. Seed drying - advantages, factors influencing and methods of drying.

Module V**(12 Hrs)**

Seed processing - principles and objectives, seed cleaning methods. Seed treatment- presowing, prestorage and mid storage seed treatments. Seed pelleting – advantages and methods. Synthetic seeds. Seed storage - classification of seeds based on storage, life span of seeds, factors affecting longevity of seeds in storage, methods of storage. Seed dormancy- classification and methods to overcome dormancy. Seed testing - ISTA rules, sampling, sampling instruments, purity test, germination test, viability test, seed vigour test. Seed deterioration. Quality seed production, classes of quality seeds, Seed certification and Seed Act.

Suggested Readings

- Khanna, L.S.1989. *Principles and Practice of Silviculture*. Khanna Bandhu, Dehra Dun. 473 p
- Smith, D. M et al. 1997. *The Practice of Silviculture: Applied Forest Ecology*. John Willey and Sons. Inc. 537p
- Umarani, R and Vanangamudi, K. 2004. *An Introduction to Tree Seed Technology*, International Book distributors. 199 p
- Khullar, P. et. al. 1991. *Forest Seed*. ICFRE, New Forest, Dehra Dun. 409 p.
- Negi, S.S. 1998. *Forest tree seed*, International Book distributors, Dehradun, India. 206p
- Bedell, P.E. 1998. *Seed science and Technology*, Indian Forestry Species. Allied publishers Ltd., New Delhi, India. 346 p
- Schmidt, L. 2000. *Guide to Handling Tropical and Subtropical Forest Seed*. Danida. 511p
- Kumar, V. *Synthetic seeds for commercial seed production*. Agrobotanica. 160p
- Luna, R. K. 2005. *Plantation trees*. International Book distributors, Dehradun, India. 975 p.
- Negi, S.S. 1985. *Silviculture of Indian trees*. Bishen Singh Mahendra Pal Singh, Dehradun. 158 p

4A14FOR - SOIL SCIENCE AND WATERSHED MANAGEMENT**Credit: 4****Hours/Week: 3****SOILSCIENCE****Module I****(12 Hrs)**

Soil - Definition and components. Soil profile. Difference between soil and sub soil. Physical properties of soil - texture, structure, density, porosity, colour, temperature and their role in soil fertility. Chemical properties of soil - Electrical Conductivity, CEC and pH. Soil formation - weathering and development of true soil. Factors influencing soil formation. Soil fertility and productivity.

Module II**(14 Hrs)**

Essential elements in soil - their functions, forms and availability, critical limit of nutrients in soil and plants. Deficiency and toxicity symptoms. Mechanisms of nutrient absorption. Nutrient cycles in soils - Carbon cycle, Nitrogen cycle, Phosphorous cycle, sulphur cycle and their role in soil fertility. Soil organic matter - Role of organic matter, decomposition of organic matter - role played by micro organisms like bacteria, fungi and actinomycetes and macro organisms like earthworms, termites and ants.

Module III**(10 Hrs)**

Forest soil- features and importance. Soils of India and Kerala. Problem soils - Acid soil, saline and alkaline soil, water logged soil and their reclamation. Soil survey - objectives and types of soil survey. Soil fertility evaluation.

HYDROLOGY AND WATERSHED MANAGEMENT**Module IV****(18 Hrs)**

Hydrology - Definition, importance and hydrological cycle. Rainfall - Characteristics, Types of rainfall and rainfall measurement. Soil erosion - types and causes. Universal soil loss equation. Water erosion - types, factors affecting and conservation methods. Wind erosion- mechanisms, types, factors affecting and control measures. Land use capability classifications.

Watershed - components and classification of water shed. Water shed management- principles and objectives. Benefits of water shed management. Water harvesting - traditional and modern methods.

Suggested Readings

Sahai, V. N. 2004. *Fundamentals of soil*, Kalyani publishers. 304 p

Buckman, H. O and Brady, N. C. 1960. *The Nature and Properties of Soils*. The Macmillan Company, New York. 980 p.

Negi, S. S. 1983. *Introductory soil science*. Bishen Singh Mahendra Pal Singh, Dehradun. 101 p

Gupta, P.K. 1999. *Handbook of soil, fertilizers and manure*. Scientific book publishers. 431p

Wilde, S.A. 1994. *Forest soils and Forest growth*. Bishen Singh Mahendra Pal Singh, Dehradun. 228p

Datta, S. K. 1986. *Soil conservation and Land use management*. International Book Distributors. 330 p.

Hamilton, I. S. 1987. *Forest and Watershed Development and Conservation in Asia and the Pacific*. International Book Distributors, Dehra Dun. 537p.

Murty, J. V. S 1995. *Watershed Management in India*. Wiley Eastern, New Delhi.

4B05FOR - WOOD DEGRADATION, WOOD SEASONING AND WOOD PRESERVATION**Credit: 3****Hours/Week: 3****Module I: WOOD DEGRADATION****(18 Hrs)**

Natural durability of wood. Classification of timbers based on durability. Biodegradation of wood in use. Fungal defects in timber – stain and decay – origin, causes and effects of decay and stain. Types of decay – white rot, brown rot and soft rot. Wood degradation caused by insects – borers, beetles, carpenter bees, termites. Marine wood borers.

Module II: WOOD SEASONING**(18 Hrs)**

Wood water relationship - shrinkage, swelling, movement, fibre saturation point, equilibrium moisture content. Wood seasoning - merits, principles and types - Air seasoning, Kiln seasoning and Chemical seasoning. Refractory classes of timbers. Kiln schedules. Seasoning defects and their control.

Module III: WOOD PRESERVATION**(18 Hrs)**

Wood preservation -principles, processes and need. Types of wood preservatives - water soluble leachable, water soluble fixed, oil based, organic solvent type. Fire retardants and their usage. Non-

IV. Tree Physiology

3. Determination of relative water content
4. Estimation of stomatal density
5. Effect of growth regulators on seed germination and rooting of cuttings
6. Determination of water potential using pressure bomb apparatus
7. Determination of permanent wilting point and field capacity of soil
8. Experiment to demonstrate geotropism using Clinostat
9. Experiment to demonstrate osmosis by thistle funnel
10. Experiment to demonstrate process of transpiration using cobalt chloride paper
11. Experiment to measure rate of transpiration using Ganong's potometer
12. Measurement of photosynthesis by Wilmott's bubbler
13. Experiment to measure the rate of respiration using Ganong's respirometer
14. Estimation of total chlorophyll content
15. Plant growth analysis – RGR, NAR, LAR - Leaf Area Index (LAI)

V. Anatomy, Structure and Properties of Wood

1. Distinctive surfaces of wood - transverse, radial and tangential planes
2. Maceration, staining and permanent slide preparation
3. Chemical, physical and mechanical properties of important timber species
4. Determination of moisture content in wood
5. Determination of specific gravity of wood
6. Determination of extractives in wood
7. Tests for mechanical properties – static bending, impact bending, compression parallel to grain, compression perpendicular to grain, indentation test, shear test, tension perpendicular to grain, tension parallel to grain, torsion test, nail and screw pulling test.

VI. Wood Degradation, Wood Seasoning and Preservation

1. Studies on defects in wood – natural and seasoning defects
2. Studies on wood boring insects
3. Graveyard test to determine natural durability of wood
4. Termite resistant test
5. Spot tests for determination of penetration of preservatives in wood
6. Determination of efficacy of wood preservatives

VII. Practices of Silviculture and Nursery management

1. Determining area required for nursery
2. Preparation of nursery bed
3. Soil working techniques
4. Types of plant containers and media
5. Stump preparation
6. Patterns of planting
7. Number of plants required for given spacing
8. Spacing required for given number of plants

VIII. Forest Seed Technology

1. Important forest tree seeds
2. Quantity of seeds required in a nursery and a plantation area
3. Sampling of seeds
4. Purity testing

5. Seed viability tests – Tetrazolium Chloride test, Hydrogen Peroxide test
6. Breaking of seed dormancy
7. Germination testing

IX. Soil Science and Watershed Management

1. Collection and preparation of soil samples
2. Determination of soil pH, electrical conductivity, particle density, bulk density and porosity
3. Examination of soil profile
4. Soil moisture determination
5. Determination of soil texture
6. Estimation of Organic carbon by Walkley and Black method
7. Determination of available nitrogen, phosphorous and potassium
8. Study of different water harvesting structures

Collections and submissions: Each student shall submit not less than 20 forest tree seeds, five wood specimens and 20 forest tree herbaria along with field book.

5B07FOR - WOOD PROCESSING, MANUFACTURING OF WOOD PRODUCTS AND WOOD BASED INDUSTRIES

Credit: 3

Hours/Week: 3

WOODPROCESSING

Module I (15 Hrs)

Wood machining, sawing – techniques-plain sawing, quarter sawing and rift sawing. Kinds of saws- cross cut, edging, cudless, hand, circular and bow saws. Wood working and tools used in wood working - parting, slicing, shaping, measuring and marking tools. Various stages in wood working. Wood joining - different types of wood joints – lap joints, mitre, dove tail and tenon-mortise. Dimensional stabilization of wood by surface coating method, bulking method, impregnation of resins and polymers.

MANUFACTURINGOFWOODPRODUCTS

Module II (12 Hrs)

Veneers – manufacture and types. Composite wood - plywood, fiber board, particle board, hardboard - manufacture, properties and uses. Adhesives used in the manufacture of composite wood – natural and synthetic. Improved wood - definition, types of improved woods, impregnated wood, heat stabilized wood, compressed wood, chemically modified wood. Wood-plastic and wood-metal composites.

Module III (12 Hrs)

Manufacture of paper - Pulping- mechanical, chemical, semi-chemical and semi-mechanical. Pulp bleaching; stock preparation and sheet formation. Types of paper. Manufacture of rayon. Destructive distillation of wood. Saccharification of wood - chemistry and processes. Miscellaneous wood products – musical instruments, sports goods, implements and handles.

WOODBASEDINDUSTRIES

Module IV

(15 Hrs)

Timber and sawn wood industries. Plywood and particle board industries. Pulp and paper industry - introduction and raw materials. Match industries – species used. Other wood-based industries - Packing case, dendro-biomass power generation industries and value addition industries. Constraints in wood based industries – wood demand and supply. Measures for development of wood based industries – technological measures, precision silviculture technology, value addition technology, design and promotion of contract farming.

Suggested Readings

- John G. Haygreen, Jim L. Bowyer. 1996. Forest Products and Wood Science, an Introduction.
- Rao, P.S. 1988. A Handbook on Indian Wood and Wood Panels, Solid Wood. Oxford University Press.
- Brown HP. 1985. A Manual of Indian Wood Technology.
- Desch, H. E and Dinwoodie, J.M. 1981. Timber: Its Structure, Properties and Utilization. The Macmillan Press.
- Mehta, T. 1981. A handbook of Forest Utilization. IBD Dehra Dun.
- Indian Forest Utilization. Vol I and II. Forest Research Institute Dehra Dun
- Rydhom S.A. 1965. Pulping process inter Science Publishers. New York
- K.W. Brit. Hand Book of pulp and paper technology. C.B.S. Publication New Delhi.

5B08FOR - FOREST ECONOMICS AND FOREST STATISTICS

Credit: 3

Hours/Week: 5

FORESTECONOMICS

Module I

(20 Hrs)

Forest economics- definition, scope and basic concepts. Importance of forestry in economic development. Development of forestry sector through five year plans. Demand – Demand theory; Law of demand; determinants of demand; Elasticity of demand (Price elasticity, Cross elasticity, Income elasticity, Advertising or promotional elasticity of demand) - Factors affecting demand function; Market demand and demand for forest products. Supply- Law of supply -Elasticity- factors affecting supply - supply of forest products. Application of concepts specific to forestry (demand, supply and prices of forest products). Production economics – Production function- concepts of product (Total product, average product, marginal product, resources and production) - Factors of production- Physical efficiency measures like Total Physical Product, Average Physical Product and Marginal Physical Product.

Module II

(20 Hrs)

Analysis of Cost : Types of costs (Marginal, Average and Total cost; Opportunity costs; Implicit and Explicit costs; Economic costs, Marginal Incremental and sunk costs; Direct and Indirect costs; Fixed and Variable costs). Factor: factor relationships, Product: product relationships. Project : project cycle - identification, formulation, appraisal, implementation, monitoring and evaluation. Cost-Benefit analysis and its application in forestry. Economic Valuation of natural resources – market based and non-market based, Total Economic Value concept, use values and non-use values and methods of valuation.

FORESTSTATISTICS

Module III

(25 Hrs)

Statistics and its importance, Data collection, classification, tabulation and graphical representation of data. Measures of central tendency- mean, median, mode, geometric mean and harmonic mean. Measures of dispersion- range, quartile deviation, mean deviation, variance and standard deviation. Probability concepts, Probability distributions- binomial, poisson, students-t and normal distribution. Test of hypothesis- Test of population mean and population proportion, test of equality of means and proportion of two populations, Test of independence, Test of equality of population variances, Analysis of Variance (ANOVA) and its assumptions, one way and two way ANOVA.

Module IV

(25 Hrs)

Experimental designs- principles (randomization, replication and local control), Experimental designs- CRD, RBD, LSD and Factorial experiments. Transformation of data- square root, Angular and Logarithmic transformations. Correlation- types of correlation, scatter diagram, coefficient of correlation. Regression- definition, regression coefficients, simple linear regression equations. Sampling theory- basic concepts- parameter and statistic, standard error, confidence interval, sampling and non-sampling errors, types of sampling- simple random, stratified, systematic, cluster and multi stage sampling. Forest informatics. Software packages of forestry importance – statistical packages, ecological analysis and database management systems.

Suggested Readings

- Muraleedharan, P. K., K. K Subramanian, P. K Pillai. 1998. *Basic Readings in Forest Economics*. KFRI. 176 p.
- Pant, M .M. 1984. *Forest Economics and Valuation- Principles of economics applied to forest management and utilization*. Madhavi publishers. 612p
- Johl, S. S and T. R Kapur. 1973. *Fundamentals of Farm business management*. Kalyani publishers. 475 p
- Johl, S. S and T. R Kapur. 2012. *Fundamentals of Farm business management*. Kalyani publishers. 415 p
- Jayaraman, K. 2001. *A handbook on Statistical analysis in forestry research*. KFRI. 203p
- Banerjee, P. K. 2013. *Introduction to Biostatistics*. S Chand Publications. 208p
- Sharma, A. K. 2005. *Text book of Biostatistics I*. Discovery Publishing House. 480 p
- Sharma, A. K. 2005. *Text book of Biostatistics II*. Discovery Publishing House. 464 p
- Rangaswamy, R. A. *A text book of Agricultural statistics*. New age International (P) Limited Publishers. 500p

5B09FOR - FOREST MENSURATION, FOREST SURVEY AND REMOTE SENSING

Credit: 3

Hours/Week: 5

FORESTMENSURATION

Module I

(25 Hrs)

Introduction - definition, objectives and scope. Units of measurement. Measurement of individual trees. Breast height measurement – advantages and standard rules. Measuring diameter and girth - Instruments used - merits and demerits. Measurement of upper stem diameter – instruments used. Bark thickness – conversion of GOB to GUB and DOB to DUB. Tree height – definitions of Total height, bole

height, commercial bole height, crown point, crown height and crown length. Methods of measurement of height-ocular-non instrumental and instrumental methods – instruments based on geometric principles and trigonometric principles. Measurement of cross sectional area, basal area, leaf area. Tree stem form - Metzger's theory - form factor-types of form factor-form height- form quotient - form class.

Module II

(25 Hrs)

Volume measurements of trees-Definitions of Commercial volume, standard stem timber volume, standard stem small timber volume. Calculation of volume of felled trees- Smalian's formula-Huber's formula- Prismoidal or Newton's formula - Quarter girth formula. Volume of standing trees-ocular-partly ocular-direct and indirect measurements. Volume tables-classification of volume tables. Measurement of branch wood and root wood-solid volume and stacked volume. Determination of age of trees. Determination of growth of trees - Increment - classification of increment- relationship between CAI and MAI. Stump analysis and stem analysis. Measurement of tree crops - crop diameter, crop height, crop age and crop volume.

FORESTSURVEY

Module II

(20 Hrs)

Forest surveying – definition and objectives. Classification of surveying. Chain survey – types and procedures. Traversing, triangulation, survey stations, base line, check and tie lines, ranging of survey lines, offsets and their types. Chaining across obstacles. Compass surveying – Procedure. Chain and Compass survey. Plain Table Survey – scope, different methods and procedures, advantages and disadvantages, applications in forestry. Topographical survey. Levelling - terms used, types of level. Theodolite and its uses. Contour surveying. Maps and map reading. Importance of maps in forestry.

REMOTESENSINGANDGIS

Module III

(20 Hrs)

Remote sensing - definition, principles, scope and brief history. Electromagnetic spectrum, differential reflections by surfaces. Active and passive remote sensing. Satellite systems. Aerial photography – classification, platforms and sensors. Aerial photo interpretation and digital image processing. Applications of remote sensing in forestry. Vegetation mapping and forest cover monitoring. GPS – working principle and applications. GIS. Components of GIS. Spatial and non-spatial data. Raster and Vector data. Integration of attribute data with spatial data. Thematic overlays in GIS. Application of GIS in forestry.

Suggested Readings

- Chaturvedi, A.N and Khanna,L.S (1982) Forest Mensuration , International Book Distributors, Dehra Dun
- Husch, B, Bers, T.W and Kershaw, J (2003). Forest Mensuration, John Wiley & Sons. INC, USA.
- Husch,B,Miller,C and Bers, (1972) Forest Mensuration, Ronald Press company, New York
- Philip, M.S, (1994). Measuring tree and forests, CAB International, UK
- Punna, B.G. 1987. Surveying. Laxmi Publishers, New Delhi
- Sahani, P.B. 1979. Text book of surveying Vol. I & II. Oxford and IBH., New Delhi
- Sharma, M. K. 2001. Remote sensing and Forest surveys. IBD, Dehra Dun
- Bhatt, A.B. 1994. Aerial photography and remote sensing. Oxford University press
- Furrows et. al. Introduction to GIS. Oxford University press
- Patel, A.N. and Singh, S. 1999. Principles of remote sensing. Oxford University press

5B10FOR - FOREST MANAGEMENT AND UTILIZATION

Credit: 3

Hours/Week: 4

FORESTMANAGEMENT

Module I (20 Hrs)

Forest Management - Definition, scope, objects and principles. Art and science of forest management. Forest management in relation to industrial and agricultural management. Organization and control of forest property and personnel. Rotation – types, factors determining length of rotation and choice of rotation. Concepts of yield – sustained yield and progressive yield. Normal forest – definition and concept. Causes of abnormality in forests. Increment – CAI, MAI and Increment Percent. Growing stock. Yield regulation – definition and objectives. Yield regulation based on area, volume, area and volume.

Module III (20 Hrs)

Forest legislation – history and scope of forest laws. Forest policies of 1894, 1952 and 1988 –comparison and management strategies adopted. Salient features of Indian Forest Act 1927, Wildlife Protection Act 1972, Forest Conservation Act 1980 and Scheduled Tribes (Recognition of Forest Rights) Act 2006. Forest Certification. Working Plan – scope and purpose. Formulation and drawing of working plan. Field work – survey, enumeration and mapping. Standard format of a working plan. Joint forest management – concept, benefits and impact. Success stories from Indian scenario. Village Forest Council – formation and functions.

FORESTRESOURCEUTILIZATION

Module III (20 Hrs)

Felling and Conversion – Methods of felling and felling rules. Mechanized harvesting systems – felling equipments, extraction equipments and loading equipments. Log making. Timber transportation. Reduced Impact Logging. Storage of timber and timber depot. Systems of sale of forest produce. Non-Timber Forest Products (NTFP) – Definition and their importance in rural and industrial economy of India and Kerala. Important NTFP in India and Kerala viz. Fodder (grasses and tree leaves). Canes and bamboos – derived products and uses. Essential oils – classification, methods of extraction and uses. Non-essential oils - occurrence, classification, methods of extraction and uses. Gums, resins and Oleoresins - classification, sources, extraction and uses. Tans - classification, source plants and uses. Dyes – classification, sources of dyes and uses. Fibers and flosses – classification, source plants and uses.

Module IV (12 Hrs)

Medicinal and aromatic plants in Kerala – uses and economic importance of the following plants - Lemon grass, Citronella, Vetiver, Mint, Eucalyptus, Sandal wood, Rawolifia, *Cassia fistula*, *Saraca asoca*, *Emblica officinalis*, *Gmelina arborea*, *Wrightia tinctoria*, *Holarhena antidysentrica* and *Terminalia spp.*, Animal products – Honey and wax, Lac and silk – their cultivation methods, extraction and uses. Miscellaneous products - Wild fruits, leaves, latex, poisons, mineral products etc. Beedi leaves - sources, collection and processing. Cutch and Katha - extraction and uses.

Suggested Readings

Ramprakash. 2001. *Forest management*. International Book Distributors. Dehradun 256p

- Negi, S.S. 1984. *Scientific management of forest*. Bishen Singh Mahendra Pal Singh, Dehradun. 123 p.
- Negi, S.S. 1997. *Forest Policy and Law*. Bishen Singh Mahendra Pal Singh, Dehradun. 257p.
- Mehta, T. 1981. *A Handbook of Forest Utilization*. International Book Distributors. 208 p.
- Nair K.K.N. 2000. *Manual of Non-wood Forest produce plants of Kerala*. Kerala Forest Department Government of Kerala, Thiruvananthapuram. 449 p.
- Krishnamurthy, T. *Minor Forest Products of India*. Oxford & IBH Publishing Co. Pvt. Ltd. 645 p.
- Sharma, L.C. 1988. *The Indian Pulp and Paper Industry at a glance*. Bishen Singh Mahendra Pal Singh, Dehradun. 280p.
- Singh, M.P. 2011. *Wild Medicinal Plants*. Daya Publishing House. 368p
- Jain, S. K. 1995. *A manual of Ethnobotany*. Scientific publishers. 193 p

5B11FOR - CORE PRACTICAL – II

Credit: 4

Hours/Week: 6

I. Wood Processing

1. Methods of sawing – plain sawing, quarter sawing and rift sawing
2. Kinds of saws

II. Manufacturing of Wood Products

1. Kinds of wood joints
2. Manufacture of Plywood, Particle board and Fibre board
3. Carrying out of mycological test of plywood
4. Manufacture of paper
5. Manufacture of rayon
6. Determination of Kappa number of pulp
7. Determination of quality of fibre, pulp and paper
8. Destructive distillation of wood

III. Forest Statistics

1. Construction of frequency distributions
2. Graphical representation of data
3. Calculation of measures of central tendency
4. Calculation of measures of dispersion
5. Problems on probability distributions
6. Tests of significance - t- test, Z test, Chi square test and F test
7. Analysis of variance- one way classification and two way classification
8. Layout and analysis of CRD, RBD and LSD
9. Calculation of correlation coefficient
10. Calculation of regression coefficient
11. Estimation of mean and proportion and its confidence interval for simple random, stratified sampling schemes

IV. Forest economics

1. Demand and supply of forest products (*timber/ forest based industries*)
2. Benefit-cost analysis (*private and public projects*)
3. Economic valuation of forest goods and services (*tangible and intangible benefits of natural resources*)

V. Forest Mensuration

1. standard rules governing breast height measurement
2. Instruments used in diameter and girth measurement
3. Conversion of GOB into GUB and DOB into DUB
4. Non-instrumental methods of tree height measurements
5. Instrumental methods of tree height measurements
6. Measurement of tree height using Christen's Hypsometer, Smythies Hypsometer, Modified Smythies Hypsometer, Brandis Hypsometer, Haga Altimeter and Ravi Altimeter
7. Calculation of volume of standing trees and logs
8. Determination of age of a tree using Increment Borer
9. Determination of age of a tree by three periodic measurements

VI. Forest Survey

1. Instruments used in Chain Survey
2. Chain survey of an area
3. Chain survey across obstacles
4. Angle measuring instruments
5. Chain and compass traversing
6. Study of plane table and accessories
7. Plane table surveying of an area
8. Study of levelling instruments
9. Forest map reading
10. Regeneration survey, vegetational survey and stock maps

VII. Remote Sensing and GIS

1. Study of scales of photographs
2. Preparation of base map using survey of India map
3. Visual interpretation of satellite imagery
4. Softwares used in GIS
5. Digitization of maps
6. Preparation of species distribution map using GPS and GIS tools
7. Digital Image Processing – preparation of NDVI map

VIII. Non Timber Forest Products

1. Important non-timber forest products in Kerala
2. Important medicinal and aromatic plants in Kerala
3. Manufacture of shellac
4. Manufacture of Kuch and Katha
5. Resin Tapping and Manufacture of Turpentine

Collections and submissions: Each student shall submit not less than 20 non timber forest products representing dyes, tans, fibre, floss, gums, resins, animal products, medicinal, aromatic and other miscellaneous products.

5B12FOR - FORESTRY FIELD EXPERIENCE

Credit: 2

Hours/Week: Nil

Each student shall undergo practical training and field works at the following areas/institutes and make detailed reports.

Protected areas – wildlife Sanctuary / National Park

Forest/Wood Based Industry

A research institute

Forest Depot

Forest Nursery

An ecotourism site

A tribal hamlet

Each student shall maintain a field diary to record the observations. The student should submit the field diary for internal evaluation. Each student shall submit a report based on his/her field diary and the report may be evaluated by the external examiner at the end of sixth semester.

6B13FOR - FOREST ENTOMOLOGY, FOREST PATHOLOGY AND FOREST PROTECTION

Credit: 3

Hours/Week: 4

FORESTENTOMOLOGY

Module I

(10 Hrs)

History and importance of Forest Entomology in India. Definition of insect and its position in the animal kingdom. Taxonomic classification of class Insecta. Insect growth and development. Diagnostic features of the insect orders of forestry importance – Coleoptera, Lepidoptera, Isoptera, Hymenoptera, Orthoptera, Hemiptera and Homoptera. Beneficial role of insects. Useful insects – honey bees, silk worms and lac insects.

Module II

(20 Hrs)

Adverse functions of insects. Major insect pests, nature of damage and management, of forest seeds, forest nursery and trees such as Teak, Rosewood, Sal, Ailanthus, Sandal, Neem, Casuarina, Eucalyptus and Bamboos. Insect pests of freshly felled trees and finished timbers, and their management. Methods and principles of insect pest management - mechanical, physical, silvicultural, legal, biological and chemical. Classification of insecticides and their mode of action. Principles and techniques of Integrated Pest Management.

FORESTPATHOLOGY

Module III

(15 Hrs)

History of forest pathology in India and the world. Classification of tree diseases. Broad classification of pathogens causing tree diseases. Distribution, economic importance, symptoms, etiology and management of diseases of important forest species like Teak, Rosewood, Sal, Ailanthus, Sandal, Neem, Casuarina, Eucalyptus and Bamboos.

Module IV

(7 Hrs)

Principles of forest disease management - Definition and scope of disease management in forestry. Importance of disease cycle and economic threshold in disease management. Principles of disease

management such as exclusion, cultural, chemical biological and immunization. Nature of disease resistance.

FOREST PROTECTION

Module V (10 Hrs)

Forest Protection: Introduction, Susceptibility of forests to damage, need of forest protection. Damages by human agency, encroachment, shifting cultivation, faulty management. Indirect and direct measures to control the damages. Forest fires - nature and classification of forest fires. Fire environment. Damage caused by forest fire. Detection and control of forest fires.

Module VI (10 Hrs)

Damage by wild and domestic animals and their control. Advantages and disadvantages of forest grazing rotational and controlled grazing, damage by weeds, climbers, lianas, epiphytes and phanerogamic parasites. Methods to control them include biological control. Damage by adverse climatic factors like snow, frost, hail, heavy rain and avalanche. Damage by drought, water logging, shifting sands, lightning and storms. Damage by air pollutants, toxic gases and their management.

Suggested Readings

- Bakshi, B.K. Forest Pathology. 1976. Principles and Practices in Forestry. Controller of Publications, New Delhi.
- Khanna, L.S. 1984. Forest Protection, Khanna Bandhu, Dehra Dun.
- Beeson, C.F.C. 1941. Forest Insects of India, The Ecology and Control. Bishen Singh and Mahendrapal Singh, Dehra Dun.
- Herrick, G.W. 1988. Insect Enemies of Trees. Pioneer Publishers, Jaipur.
- Kumar, V. 1995. Nursery and Plantation Practices in Forestry. Scientific Publishers, Jodhpur

6B14FOR - ECOTOURISM, URBAN FORESTRY AND LANDSCAPE MANAGEMENT

Credit: 3

Hours/Week: 4

ECOTOURISM

Module I (20 Hrs)

Tourism-definition and history- Forms and categories of tourism. Classification of tourism. Dimensions and basic components of tourism. Ecotourism-definition and elements of ecotourism. Principles and objectives of ecotourism. Potential of ecotourism in India and Kerala. Forms of ecotourism- hard and soft ecotourism. Stakeholders in ecotourism. Organizations and NGO's promoting ecotourism. Environmental and social impacts of ecotourism. Ecotourism and sustainable development – guidelines for sustainable ecotourism.

Module II (20 Hrs)

Planning ecotourism in protected areas - carrying capacity and zoning. Impact monitoring in ecotourism sites. Ecotourism in important protected areas of India- Keoladeo National park, Kanha National Park, Sunderbans Tiger Reserve, Jim Corbett National Park, Periyar Tiger Reserve, Thenmala Ecotourism, Wayanad, Parambikulam and Bandipur National Park. Ecotourism as a business opportunity - business

plan, marketing plan, green consumerism and unique selling points in ecotourism marketing. Economic valuation of ecotourism sites - based on travel cost method. World Ecotourism Summit.

URBANFORESTRY

Module III

(14 Hrs)

Forest Recreation – definition and objectives. Social and environmental aspects of recreation. Urban forestry- definition and scope. Uses of urban forest- climatic, engineering, architectural and aesthetic uses. Management of urban forest. Selection of trees with objectives and locality. Arboriculture and its importance in urban forestry.

LANDSCAPEMANAGEMENT

Module IV

(18 Hrs)

Landscaping - Components of landscaping - Principles, elements and practices of landscaping - pinching, Deshooting, disbudding, defoliation, staking, clipping, pruning etc. Avenue planting and planting schemes - balanced, unbalanced and sporadic system of planting. Landscaping for specific situations - educational institutions, industries, residents, hospitals, avenues, parks, traffic islands, damsites, bridges, parking area and other structures.

Suggested Readings

- Hosetti, B.B. 2007. *Ecotourism development and management*, Pointer publishers, Jaipur. 358 p
- Honey, M. 2008. *Ecotourism and Sustainable development*. Island Press. 551p.
- Chiranjeev, A. 2008. *Ecotourism planning and Development*. Jnanada Prakashan.
- Chiranjeev, A. 2008. *Ecological, Social and Cultural aspects of Ecotourism*. Jnanada Prakashan.
- Chiranjeev, A. 2008. *Concept of tourism*. Jnanada Prakashan.
- Aaradhana, S. 2009. *Indian tourism, Wildlife tourism and Ecotourism*. Jnanada Prakashan. 288 p.
- Miller, R. W. 1997. *Urban forestry. Planning and managing urban green spaces*. Prentice Hall. 404 p.
- Nambisan KMP.1992. *Design Elements of Landscape Gardening* . Oxford & IBH. 212 p.
- Valsalakumari et al. 2008. *Flowering Trees*. New India Publ. Agency.

6B15FOR - FOREST GENETICS, TREE IMPROVEMENT AND BIOTECHNOLOGY

Credit: 3

Hours/Week: 5

FORESTGENETICS

Module I

(20 Hrs)

History of genetics, Physical basis of heredity, cell reproduction – mitosis - meiosis and its significance. Mendel's principles of heredity, deviation from Mendelian inheritance . Chromosome theory of inheritance, gene interaction: modification of monohybrid and dihybrid ratios. Multiple alleles, quantitative inheritance, linkage and crossing over, sex determination - theories, sex linked inheritance and characters.

Module II (10 Hrs)

Cytoplasmic inheritance and maternal effects. Chemical basis of heredity: Structure of DNA and its replication. Gene action – protein synthesis. Mutation and its classification. Chromosomal aberrations: Changes in chromosome structure and number.

TREEIMPROVEMENT

Module III (12 Hrs)

History and development of tree improvement, advantages and limitations of forest tree improvement. Reproduction in forest trees. Anthesis and pollination –Incompatibility and sterility. Quantitative inheritance - Genetic, environmental and interaction components of variation - heritability and genetic advance.

Module IV (18 Hrs)

Genetic basis of tree breeding and selection practices in forest trees. Natural variability in trees – types and importance - forces that change variability. Exotic forestry. Provenance testing - seed production areas – seed orchards. progeny trial and improvement of seed orchards. Combining ability and genetic gain– Hybridization in trees – back cross breeding, heterosis breeding. Clonal forestry. applications of tree breeding in forestry.

BIOTECHNOLOGY

Module V (20 Hrs)

Plant tissue culture – Principles, Advantages, History and developments. Tissue culture techniques. Explant collection. Culture media – types and components. Sterilization of living and non-living articles. Inoculation, incubation, hardening and planting out. Pathways of plant regeneration – organogenesis and somatic embryo genesis. Synthetic seeds. Embryo culture – significance. Protoplast isolation and culture. Somatic hybridization. Clonal multiplication.

Module VI (10 Hrs)

Problems of invitro propagation. Applications of invitro propagation in Forestry. Genetic engineering and recombinant DNA technology – applications in forestry. Transgenic varieties. Germplasm preservation – short, medium and long term storage.

Suggested Readings

- FAO. 1985. Forest Tree Improvement, FAO Pub.
- Mandal AK & Gibson GL. (Eds.). 1997. Forest Genetics and Tree Breeding. CBS.
- Surendran C, Sehgal RN and Parmathama M. (eds). 2003. *A Text Book of Forest Tree Breeding*. ICAR.
- Zobel BJ and Talbert J. 1984. Applied Forest Tree Improvement. John Wiley & Sons.
- Gupta, P.K. 2000. Molecular Biology and Genetic Engineering. Rastogi Publ. New Delhi
- Kumar, S. and Singh, M.P. 2008. Plant Tissue Culture. APH Pub. New Delhi
- Punia, M.S. 1998. Plant Biotechnology and Molecular Biology. Scientific Pub.
- Bajaj YPS. (ed.). 1988. Biotechnology in Agriculture and Forestry. Springer Verlag.

6B16FOR - WILDLIFE SCIENCE AND HUMAN DIMENSIONS

Credit: 4

Hours/Week: 6

FUNDAMENTALS OF WILDLIFE SCIENCE

Module I (8 Hrs)

Geological time scale and evolution of animals. Detailed classification of vertebrates. Species – definition and types. Wildlife – Definition and values of wildlife. Characteristics of wildlife in different biomes and zoogeographic regions of the world.

Module II (10 Hrs)

Behaviour of wild animals - instinctive behaviour, learned behaviour, dispersal behaviour, social behaviour, and reproductive behaviour. Clutch size and litter size. Age of maturity. Territory and Home range. Significance of territory. Adaptations of wild animals – aestivation, hibernation, torpor and diapause. Predator avoidance – camouflage, mimicry and schooling.

Module III (30 Hrs)

Characteristic features, distribution, conservation status and representatives of Indian and Western Ghats mammals of Orders Insectivora, Scandentia, Chiroptera, Primates, Carnivora, Cetacea, Sirenia, Proboscidea, Perissodactyla, Artiodactyla, Pholidota, Rodentia and Lagomorpha. Herpetology and the major reptiles and amphibians of India with special reference to Western Ghats. Ornithology and brief knowledge on bird morphology. Bird ecology and behaviour – communication, feeding, breeding, nesting and reproductive behaviour. Bird migration – reasons, patterns and mechanics of migration.

WILDLIFE MANAGEMENT

Module IV (10 Hrs)

Wildlife census – Purpose and techniques. Direct and indirect methods. Sample and total counts, indices, encounter rates, block counts, road side counts, dung counts, pug mark census, water hole census, line transect. Telemetry, visual tagging, marking and ringing in birds.

Module V (20 Hrs)

Threats to wildlife. Wildlife trade, CITES and TRAFFIC. Man-wildlife conflicts and mitigation measures. Wildlife conservation – insitu and exsitu measures, introduction and reintroduction, captive breeding and conservation projects. Threatened and Endemic species of mammals, reptiles, amphibians and birds of Western Ghats. Wildlife Protection Act 1972 – salient features and schedules.

HUMAN DIMENSIONS IN FORESTRY

Module VI (30 Hrs)

Ethnobiology - definition, Ethno botany and Ethno zoology. Tribes in India and Kerala. General economic, political and social structure. Cultural traditions, customs, ethos, beliefs and practices. Tribal economy - features, occupational characteristics, interdependence with forests, role of NWFP in the life of tribes. Tribes and Forest policies - Rights and concessions. Problems faced by tribes of India - exploitation and land alienation. Legal provisions to safeguard tribal interests – Forest Right Act 2006. Eco development through tribal development - Case study of Periyar Tiger Reserve.

Suggested Readings

- Dasmann, R.F. 1982. Wildlife Biology. Wiley Pub. New York.
- Rajesh, G. Fundamentals of Wildlife Management, Justice Home, Allahabad.
- Reena Mathur. 1985. Animal Behaviour. Oxford Univeristy Press
- Gee EP. 2000. The wildlife of India. Harper Collins Publication.
- Johnsingh AJT. (Ed.). 2003. The Mammals of South Asia: Ecology, Behaviour and Conservation. Permanent Black.
- Nameer, P.O. 2000. Checklist of Indian mammals. Kerala Forest Department. 90 + xxv
- Prater, S.H. 1971. The Book of Indian Animals. Oxford University press, Bombay.
- Vivek Menon. 2003. Field Guide to Indian Mammals. Penguin Books, India.
- Sawarkar B. Wildlife Management. Wildlife insitutue of India. Dehra Dun
- Neelakantan, K.K. 1984. "Keralathile Pakshikal". Kerala Sahithya Academy, Thrissur. 584pp.
- Grimmet, R. Inskipp T and Inskipp, I. 2000. Pocket Guide to the of Birds of Indian subcontinent. Christopher Helm series.
- Grimmet, R. Inskipp, T and Nameer, P.O. 2007. Birds of southern India, BNHS series.
- Furer-Haimendorf, C.V. Tribes of India - the struggle for survival. OUP. New Delhi
- Sharma, R.N. and Bakshi, S. Tribes and tribal development. Uppal Publ. House, New Delhi
- Thakur, D. Socio-economic development of tribes in India. Deep and Deep Publications, New Delhi
- Jain S.K. Glimpses of India Ethnobotany. Oxford and I.B.H New Delhi.

6B17FOR - CORE PRACTICAL – III

Credit: 4

Hours/Week: 6

I. Forest Entomology

1. Study of Insect collection, pinning, labelling and preservation
2. Study of representatives of insect orders of forestry importance
3. Study of insect pests of forest seeds and forest nurseries
4. Study of insect pests of standing trees, freshly felled trees and finished products

II. Forest Pathology

1. Collection, observation and preservation of diseased specimens and pathogenic structures
2. Preparation of culture media, isolation and subculturing of pathogens
3. Causative agents, symptoms and control measures of diseases of important forest trees

III. Ecotourism

1. Stakeholder analysis and social impact assessment
2. Estimation of carrying capacity
3. Preparation of ecotourism plan
4. Ecotourism destinations in Kerala

IV. Urban Forestry and Landscape Management

1. Preparation of a garden design

2. Preparation of planting pattern for avenues
3. Selection of trees for avenue planting based on objectives

V. Forest Genetics and Tree Improvement

1. Working out problems related to monohybrid cross, dihybrid cross, independent assortment, linkage, incomplete dominance, multiple alleles and chi-square
2. Preparation of slides for the study of mitosis and meiosis
3. Asexual method of plant propagation through budding, grafting and layering
4. Measurement of pollen size and pollen fertility
5. Estimation of genetic advance, heritability and GCA

VI. Biotechnology

1. Important instruments used in tissue culture lab
2. Preparation of plant tissue culture medium
3. Surface sterilization
4. Production of synthetic seeds
5. Invitro production of haploid plants through anther culture
6. Experiment to demonstrate process of plasmolysis
7. DNA isolation techniques and electrophoresis
8. Agrobacterium mediated gene transfer

VII. Biochemistry

1. Qualitative tests for carbohydrates (starch, lactose/maltose, sucrose, glucose and fructose)
2. Qualitative test for proteins (Biuret test, Millon's test and nitric acid test)
3. Qualitative test for lipids

VIII. Wildlife Science

1. Exercise on the census techniques - direct methods and indirect methods
2. Pitfall trap, mist net, sherman trap, camera trap, and other traps to study the wildlife
3. Characteristic features and representatives of Western Ghats birds of Orders - Podicipediformes, Procellariiformes, Pelicaniformes, Ciconiformes, Phoenicopteriformes, Anseriformes, Falconiformes, Galliformes, Gruiformes, Caradriformes, Columbiformes, Psittaciformes, Cuculiformes, Strigiformes, Caprimulgiformes, Apodiformes, Trogoniformes, Coraciiformes, Upupiformes, Piciformes and Passeriformes.

Collections and submissions: Each student shall submit not less than 10 diseased plant specimens and pathogenic structures.

OPENCOURSESINFORESTRY

5D01FOR - ECOTOURISM

Credit: 2

Hours/Week: 2

Module I

(9 Hrs)

Tourism-definition and history- Forms and categories of tourism. Classification of tourism. Dimensions and basic components of tourism. Ecotourism-definition and elements of ecotourism. Principles and objectives of ecotourism. Potential of ecotourism in India.

Module II

(9 Hrs)

Forms of ecotourism- hard and soft ecotourism. Stakeholders in ecotourism. Organizations and NGO's promoting ecotourism. Environmental and social impacts of ecotourism. Ecotourism and sustainable development.

Module III

(9 Hrs)

Planning ecotourism in protected areas-Carrying capacity and Zoning, Ecotourism in important protected areas of India- Keoladeo National park, Kanha National Park, Sunderbans Tiger Reserve, Jim Corbett National Park, Periyar Tiger Reserve, Wayanad Wildlife Sanctuary, Parambikkulam Tiger Reserve, Thenmala Ecotourism and Bandipur National Park.

Module IV

(9 Hrs)

Ecotourism as a business opportunity- business plan, marketing plan, green consumerism and unique selling points in ecotourism marketing. Economic valuation of ecotourism sites- based on travel cost method. World Ecotourism Summit.

Suggested Readings

- Hosetti, B.B. 2007. *Ecotourism development and management*, Pointer publishers, Jaipur. 358 p
- Honey, M. 2008. *Ecotourism and Sustainable development*. Island Press. 551p.
- Chiranjeev, A. 2008. *Ecotourism planning and Development*. Jnanada Prakashan.
- Chiranjeev, A. 2008. *Ecological, Social and Cultural aspects of Ecotourism*. Jnanada Prakashan.
- Chiranjeev, A. 2008. *Concept of tourism*. Jnanada Prakashan.
- Aaradhana, S. 2009. *Indian tourism, Wildlife tourism and Ecotourism*. Jnanada Prakashan. 288 p.

5D02FOR – BIODIVERSITY CONSERVATION

Credit: 2

Hours/Week: 2

Module I

(10 Hrs)

Biodiversity – Definition, history and development. Convention on Biological Diversity (CBD). Levels and classification of biodiversity. Uses and values of biodiversity – economic, ecological, cultural, scientific and educational values.

Module II

(8 Hrs)

India as a mega biodiversity nation. Biogeographic zones of India and world. Hot-spots of biodiversity – significance of Western Ghats - Endangered and endemic species. Threats to biodiversity.

Module IV

(12 Hrs)

Biodiversity Conservation: in-situ and ex-situ measures of conservation. Protected areas in India and in Kerala – National Parks, Wildlife Sanctuaries, Community Reserves and Conservation Reserves. MAB and concept of Biosphere Reserves. Ethics in conservation. Rarity and extinction of species – causes of

extinction. IUCN redlist categories and criteria. Important conservation projects – Tiger, Elephant, Gir Lion, Snow leopard, Great Indian Bustard, Crocodile breeding etc.

Module IV

(6 Hrs)

Biological Diversity Act 2002. National Biodiversity Authority and State Biodiversity Boards. Biodiversity register and Traditional Knowledge. Intellectual Property Rights – categories. GI products from Kerala.

Suggested Readings

Barucha, E. 2004. *Textbook for environmental studies for undergraduate courses*. University Grants Commission, New Delhi.

P.R. Sinha, V.B. Mathur and B. C. Sinha. 2009. *India's Green Book*. Wildlife Institute of India

Kumar and Asija. 2004. *Biodiversity – Principles and conservation*. Updesh Purohit for Agrobios, Jodhpur, India.

Kumar, A. 2004. *Biodiversity and environment*. A.P.M. Publishing Corporation, New Delhi.

Negi, S. S. 1993. *Biodiversity and its conservation in India*. India Publishing Company, New Delhi, 343p.

Official web sites of IUCN, UNESCO, WWF, MoEF, FAO, KFD etc.

Sinha, B.N. 1990. *Eco-system Degradation in India*. Ashish Publishing House, New Delhi

Hunter L Malcom. 1996. *Conservation Biology*. Blackwell Science. Chicago

5D03FOR – LANDSCAPING AND ORNAMENTAL GARDENING

Credit: 2

Hours/Week: 2

Module I

(10 Hrs)

Principles and elements of landscaping. Importance of landscaping - climatic, engineering, architectural and aesthetic uses. Practices of landscaping - pinching, Deshooting, disbudding, defoliation, staking, clipping, pruning etc. Lawn - selection of grass, soil and site, preparation of soil, planting methods and maintenance.

Module II

(6 Hrs)

Urban landscaping. Landscaping for specific situations- educational institutions, industries, residents, hospitals, avenues, parks, traffic islands, damsites etc.

Module III

(10 Hrs)

Types of gardens - English garden, Mughal garden, Japanese garden, Persian garden, Vanams and Buddha garden. Styles of garden - formal, informal and free style gardens. Special types of garden - butterfly gardens, marsh gardens, indoor gardens, rock garden, roof garden, terrace garden and water garden.

Module IV

(10 Hrs)

Garden components - edges, hedges, flower borders, flower beds, ground covers, carpet beds, herbs, shrubs, trees, climbers, creepers, bamboos, palms, ferns, cacti, succulents, topiary, bonsai, arches, pergolas, rockery, fountains, bridges, lilly pools, bird bath, garden seats, pavements, trophy, green house, arbours, statues etc.

Suggested Readings

Miller, R. W. 1997. *Urban forestry. Planning and managing urban green spaces*. Prentice Hall. 404 p.

Nambisan KMP.1992. *Design Elements of Landscape Gardening*. Oxford & IBH. 212 p.

Valsalakumari et al. 2008. *Flowering Trees*. New India Publ. Agency.

**Scheme of Examinations
&
Model Question Papers**

**Scheme of End Semester External Examination
General and Core Theory Courses (Duration 3 Hrs)**

Pattern	Total No. of questions	No. of questions to be answered	Marks for each question	Total marks
One word	8	8	0.5	4
Short answer	10	7	2	14
Paragraph/Application level questions	6	4	3	12
Essay	4	2	5	10
TOTAL	28	21		40

**Scheme of End Semester External Examination
Open Course (Duration 2 Hrs)**

Pattern	Total No. of questions	No. of questions to be answered	Marks for each question	Total marks
One word	4	4	0.5	2
Short answer	7	4	2	8
Paragraph/Application level questions	4	2	3	6
Essay	3	1	4	4
TOTAL	18	11		20

**Scheme of End Semester External Examination
Core Practical Courses (Duration 3 Hrs)**

The question paper for the external evaluation of core practical courses should include a major exercise, minor exercises, problems, spotters and a viva-voce. The pattern, number of questions and carrying marks of each practical course shall be followed as given in the model question papers of Core Practical – I, Core Practical – II and Core Practical – III respectively. Total marks for the external evaluation of each practical course shall be 48.

MODEL QUESTION PAPER
1B01FOR – FORESTS, FORESTRY AND FOREST METEOROLOGY

Time: 3 Hrs

Max. Marks: 40

SECTIONA

1. Choose the correct answer **(8 x 0.5 = 4 marks)**
- a. Is a tree less biome (Tundra, Taiga, Grassland, Desert)
 - b. A forest of seedling origin is known as (normal forest, pure forest, coppice forest, high forest)
 - c. According to Champion and Seth classification there are major groups of forests in India (5, 7, 16, 32)
 - d. March 21st is observed as (summer solstice, winter solstice, spring equinox, autumn equinox)
2. Give scientific names of the following trees
- a. Teak
 - b. Golden Shower
 - c. Rose Wood
 - d. Neem

SECTIONB

Write short notes on ANYSEVEN of the following questions **(7 x 2 = 14 marks)**

3. Various definitions of forest
4. Classification of forests based on ownership and legal status
5. Characteristic features of mangrove forests
6. Western Ghats
7. Carbon sequestration
8. Scales of climate
9. Weather forecasting
10. State of the forests in India
11. Difference between weather and climate
12. Solar radiation balance

SECTIONC

Answer ANYFOUR of the following questions **(4 x 3 = 12 marks)**

13. Define Forestry. Give a detailed description of the branches of forestry
14. Give two examples each for evergreen trees, deciduous trees and mangroves
15. Which are the various threats to forests
16. Charecteristic features of temperate coniferous forests
17. Give a detailed account on the various cloud forms and their indications
18. Types and forms of precipitation

SECTIOND

Write an essay on ANYTWO of the following questions **(2 x 5 = 10 marks)**

19. Champion and Seth revised classification of forests in India
20. Give a detailed account on the global forest status and the important roles of forests.
21. What are biomes? Give a detailed account on the tropical rain forest biome
22. What is global warming? Explain the importance of forests in climate change mitigation.

MODEL QUESTION PAPER

2B02FOR – FOREST ECOLOGY, BIODIVERSITY AND CONSERVATION BIOLOGY

Time: 3 Hrs

Max. Marks: 40

SECTIONA

1. Choose the correct answer **(8 x 0.5 = 4 marks)**
- Study of an individual organism is known as (Autecology, Synecology, Ethology, Democology)
 - The species seen in ecotone region is called as (keystone species, island species, endemic species, edge species)
 - Convention on Biodiversity was held in the year (1972, 1982, 1992, 2002)
 - Biosphere Reserves are declared by (IUCN, WWF, MoEF, UNESCO)
2. Expand the following
- NTCA
 - MAB
 - WIPO
 - CAMP

SECTIONB

Write short notes on ANYSEVEN of the following questions

(7 x 2 = 14 marks)

- Define ecology. Which are the various branches of ecology?
- Energy flow in an ecosystem
- Carrying capacity
- Vertical stratification in a forest
- Define biodiversity. Which are the levels of biodiversity?
- Project tiger
- Difference between wildlife sanctuaries and national parks.
- Peoples biodiversity register
- Biosphere reserves
- Turnover rate and turnover time in a biotic community

SECTIONC

Answer ANYFOUR of the following questions

(4 x 3 = 12 marks)

- What is food chain and food web? Explain the types of food chain in an ecosystem.
- Consociation and association in a forest biotic community
- What is forest succession? What are the theories of succession?
- IUCN redlist categories and criteria
- What is Intellectual Property Right? Which are the categories? Name four GI products from Kerala
- Theory of Island Biogeography

SECTIOND

Write an essay on ANYTWO of the following questions

(2 x 5 = 10 marks)

- What is an ecosystem? Give the classification of ecosystems. Explain the structure and dynamics of a forest ecosystem.
- Uses and values of biodiversity
- Biogeographic zones of India – distribution and characteristic features. Draw a map of India and show the various biogeographic zones.
- Salient features of Biological Diversity Act 2002. Give the functions of NBA and SBB

MODEL QUESTION PAPER

3B03FOR - PRINCIPLES OF SILVICULTURE AND SILVICULTURAL SYSTEMS

Time: 3 Hrs

Max. Marks: 40

SECTIONA

1. Choose the correct answer **(8 x 0.5 = 4 marks)**
- is defined as 'the direction towards which a slope faces' (Aspect, Exposure, Soil profile, Soil Horizon)
 - Ground frost is also known as..... (radiation frost, pool frost, convection frost, hoar frost)
 -is an example for light demander (*Shorea robusta*, *Dalbergia latifolia*, *Syzygium cumini*, *Pterocarpus marsupium*)
 - The canopy is.....when the density is 0.5 (closed, dense, thin, open)
2. Fill in the blanks
- The decrease in diameter of the stem of a tree or of a log from the base upwards is known as.....
 -is defined as the arrangement of individual soil particles into aggregates of definite size and shape
 - The period during which the change from one silvicultural system to another is affected is called.....
 - The type of crop obtained in uniform system is.....

SECTIONB

Write short notes on **ANYSEVEN** of the following questions

(7 x 2 = 14 marks)

- Silvicultural systems
- Site quality
- Impacts of controlled grazing
- Evergreen and deciduous tree
- Importance of soil texture
- Simple coppice system
- Clear strip system
- Regeneration period and regeneration interval
- Periodic block
- Improvement felling

SECTIONC

Answer **ANYFOUR** of the following questions

(4 x 3 = 12 marks)

- Frost injuries
- Crown differentiation
- Chemical properties of soil
- Importance of light in influencing vegetation
- Advantages and disadvantages of clear felling system
- Felling pattern in group system

SECTIOND

Write an essay on **ANYTWO** of the following questions

(2 x 5 = 10 marks)

- Topographic factors
- Influence of climatic factors on vegetation
- Uniform system- Felling pattern, tending, nature of crop, advantages and disadvantages
- Coppice forest system and its classification

MODEL QUESTION PAPER

3B04FOR – AGROFORESTRY, PLANTATION FORESTRY AND SOCIAL FORESTRY

Time: 3 Hrs

Max. Marks: 40

SECTION A

1. Choose the correct answer **(8 x 0.5 = 4 marks)**
- is an essential component of all agroforestry systems (Tree, Agriculture crop, Animal, Pasture)
 - is the practice of forestry in areas away from the conventional forest areas (Agroforestry, Extension forestry, Farm forestry, Aesthetic forestry)
 - Stump planting is recommended for (Mahogany, Acacia, Terminalia, Teak)
 - The most popular forest plantation species in Kerala (Cashew, Teak, Mangium, Coconut)
2. Fill in the blanks
- Taungya was introduced into India by -----
 - Example for a MPT species is -----
 - Term 'Social forestry' was coined by -----
 - AICRPAF stands for -----

SECTION B

Write short notes on ANYSEVEN of the following questions

(7 x 2 = 14 marks)

- Explain the disadvantages of chemical weed control
- Shifting cultivation
- Energy plantations
- Protein bank
- Major benefits of social forestry
- Mention four species suitable for saline and alkaline soil
- Mention four fodder yielding trees
- Choice of species for plantation
- What are the major forest products derived from social forestry plantations
- Nutrient pumping

SECTION C

Answer ANYFOUR of the following questions

(4 x 3 = 12 marks)

- Describe different types of planting patterns in plantations
- Windbreaks and shelterbelts
- HDSR plantations
- Explain the major characteristics of multipurpose tree species with suitable examples
- What are the objectives of roadside planting?
- Matchwood plantations

SECTION D

Write an essay on ANYTWO of the following questions

(2 x 5 = 10 marks)

- Explain the advantages and disadvantages of planting exotic species.
- Functional classification of agroforestry systems.
- Explain the adverse effects of trees on soil with suitable examples
- Classify the wastelands in India. Write the major characteristics of different wastelands.

MODEL QUESTION PAPER
3A11FOR – DENDROLOGY AND TREE PHYSIOLOGY

Time: 3 Hrs

Max. Marks: 40

SECTIONA

1. Choose the correct answer (8 x 0.5 = 4 marks)
- a. ----- is a synthetic auxin (IAA, IBA, 2,4-D, GA)
 - b. Water potential of pure water is (1, 1, 0, 1.5)
 - c. The alternative name of Guttiferae (Malvaceae, Clusiaceae, Fabaceae, Myrtaceae)
 - d. *Azadirachta indica* belongs to family (Meliaceae, Rutaceae, Guttiferae, Rubiaceae)
2. Fill in the blanks
- a. LAI stands for
 - b. Loss of water in the form of water droplets through plant organs is termed as -----
 - c. Binomial nomenclature was developed by
 - d. Teak belongs to the family

SECTIONB

Write short notes on **ANYSEVEN** of the following questions (7 x 2 = 14 marks)

3. Z scheme
4. Plant water potential
5. Structure of chlorophyll molecule
6. Root pressure
7. C2 cycle
8. Types of bark
9. Phyllotaxy
10. Features of family Myrtaceae
11. Scope of dendrology
12. Features of family Rubiaceae

SECTIONC

Answer **ANYFOUR** of the following questions (4 x 3 = 12 marks)

13. RUBISCO
14. Antitranspirants.
15. Photorespiration
16. Principles of nomenclature
17. Herbaria and its importance
18. Diagnostic features of family Rhizophoraceae

SECTIOND

Write an essay on **ANYTWO** of the following questions (2 x 5 = 10 marks)

19. Arnon's criteria for essentiality
20. What is transpiration and what are the factors affecting rate of transpiration
21. Outline of Bentham and Hooker classification
22. Systematic position, diagnostic features and economic importance of family Verbenaceae

MODEL QUESTION PAPER
3A12FOR - ANATOMY, STRUCTURE AND PROPERTIES OF WOOD

Time: 3 Hrs

Max. Marks: 40

SECTIONA

1. Choose the correct answer **(8 x 0.5 = 4 marks)**
- a. Heartwood is more durable due to the presence of ----- (starch, pectin, extractives, hemicellulose)
 - b. Thermal conductivity is maximum along ----- plane (tangential, radial, longitudinal, all)
 - c. The ignition temperature of wood is about ----- °C (100, 275, 400, 1000)
 - d. Softwoods lack----- (lignin, bark, vessels, phloem)
2. Fill in the blanks
- a. ITTO stands for -----
 - b. Teak is a ----- porous wood
 - c. Portion of wood that conduct water is -----
 - d. Reaction wood formed in conifers is known as -----

SECTIONB

Write short notes on **ANYSEVEN** of the following questions

(7 x 2 = 14 marks)

3. Wood rays
4. Complex tissues
5. Resin canals
6. Twisted grain and interlocked grain
7. Live knots and dead knots
8. FSP and EMC
9. Anticlinal and periclinal division
10. MoE and MoR
11. Heartwood and sapwood
12. Tracheids and vessels

SECTIONC

Answer **ANYFOUR** of the following questions

(4 x 3 = 12 marks)

13. Acoustic properties of wood
14. Abnormalities in wood
15. Simple pits and bordered pits
16. Specific gravity of wood
17. Wood water relationship
18. Planes of surfaces in wood

SECTIOND

Write an essay on **ANYTWO** of the following questions

(2 x 5 = 10 marks)

19. Extractives in wood
20. Merits and demerits of wood as raw material
21. Mechanical properties of wood
22. Explain the mechanism of wood formation in plants

MODEL QUESTION PAPER

4A13FOR - PRACTICES OF SILVICULTURE, SILVICULTURE OF INDIAN TREES AND FOREST SEED TECHNOLOGY

Time: 3 Hrs

Max. Marks: 40

SECTION A

1. Choose the correct answer **(8 x 0.5 = 4 marks)**
- The standard size of a nursery bed.....(12.2 x 1.2 m, 11.2 x 2.1 m, 12.1x 2.1m, 11.2 x1.2 m)
 - The fruit of *Pterocarpus marsupium* is a..... (Berry, Drupe, Capsule, samara)
 - Alternate wetting and drying is a presowing treatment used for the species (Teak, Dalbergia, Chir pine, Albizzia)
 - Elite thinning is also known as.....(Light thinning, Crown thinning, Free thinning, Mechanical thinning)
2. Fill in the blanks
-is defined as the restocking of a felled or otherwise cleared woodland by artificial means
 - Natural seedling used in forest planting is called.....
 - Scientific name of Subabul is
 - Hard seed coat is the characteristic feature of family.....

SECTION B

Write short notes on **ANYSEVEN** of the following questions

(7 x 2 = 14 marks)

- Classification of nursery
- Girdling
- Seed germination
- Structure of seed
- Objects of reforestation
- Natural regeneration
- Germinative capacity and Germinative energy
- Seed dispersal
- Silviculture characters of *Shorea robusta*
- orthodox seeds and recalcitrant seeds

SECTION C

Answer **ANYFOUR** of the following questions

(4 x 3 = 12 marks)

- Seed collection methods
- Seed orchard area
- Stump planting
- Factors affecting seed germination
- Viability testing of seeds
- Pruning

SECTION D

Write an essay on **ANYTWO** of the following questions

(2 x 5 = 10 marks)

- Seed treatment methods
- Silviculture of *Tectona grandis*
- Dormancy and classification of seed dormancy
- Kinds of thinning used in regular crops

MODEL QUESTION PAPER
4A14FOR - SOIL SCIENCE AND WATERSHED MANAGEMENT

Time: 3 Hrs

Max. Marks: 40

SECTION A

1. Choose the correct answer **(8 x 0.5 = 4 marks)**
- a. The science which deals with genesis, classification and description of soil is called
(Pedology, edaphology, soil survey, soil science)
 - b.soils are seen mostly in areas of high rainfall (Red soil, Laterite soil, Alluvial soil, Black soil)
 - c.refers to the potential ability of rainfall to cause erosion (erosivity, erodibility, detachability, transportability)
 - d. The period with which rainfall occurs is known as(rainfall frequency, rainfall duration, rainfall intensity, Precipitation rate)
2. Fill in the blanks
- a. The zone around the root where microbial population was found to be maximum.....
 - b.refers to the percentage of pore space in a soil
 - c. Splash erosion is also known as.....
 - d. The various layers seen in a soil profile are called.....

SECTION B

Write short notes on ANYSEVEN of the following questions

(7 x 2 = 14 marks)

3. Soil fertility and soil productivity
4. Bulk density and particle density
5. Mechanisms of wind erosion
6. Eluviation and illuviation
7. Carbon cycle
8. Types of water erosion
9. Soil fertility evaluation
10. Reclamation of waterlogged soil
11. Rainfall characteristics
12. Objectives of watershed management

SECTION C

Answer ANYFOUR of the following questions

(4 x 3 = 12 marks)

13. Soil profile
14. Features of forest soil
15. Role of microorganisms in the decomposition of organic matter
16. Types of soil survey
17. Mechanism of nutrient absorption
18. Nitrogen cycle

SECTION D

Write an essay on ANYTWO of the following questions

(2 x 5 = 10 marks)

19. Physical properties of soil and their role in soil fertility
20. Land use capability classifications
21. Traditional and modern methods in water harvesting
22. Soils of Kerala

MODEL QUESTION PAPER

4B05FOR - WOOD DEGRADATION, WOOD SEASONING AND WOOD PRESERVATION

Time: 3 Hrs

Max. Marks: 40

SECTIONA

1. Choose the correct answer **(8 x 0.5 = 4 marks)**
- Type of wood rot in which lignin is also degraded (brown rot, heart rot, white rot, soft rot)
 - Graveyard test is carried out to test -----of wood (water content, specific gravity, durability, conductivity)
 - Shipworms are a type of ----- (molluscan borer, crustacean borer, limnoria, crab)
 - Equilibrium Moisture Content is always below (20%, 30%, 40%. 50%)
2. Fill in the blanks
- CCA stands for -----
 - is an example of white rot fungi
 - is an example of fire retardant used in wood
 - Creosote is ----- type of preservative

SECTIONB

Write short notes on ANYSEVEN of the following questions

(7 x 2 = 14 marks)

- Natural durability of wood
- Stain and decay
- Chemical seasoning
- Kiln schedules
- Boucherie process
- Factors influencing wood deterioration
- List out the properties of an ideal wood preservative
- Symptoms of fungal decay
- Chemistry of decay
- Fibre saturation point

SECTIONC

Answer ANYFOUR of the following questions

(4 x 3 = 12 marks)

- Principles of wood seasoning
- Explain the effects of seasoning on wood properties
- Different types of kilns used for seasoning
- Distribution of water in wood
- Need for wood preservation
- Seasoning defects

SECTIOND

Write an essay on ANYTWO of the following questions

(2 x 5 = 10 marks)

- Classification of Indian timbers for seasoning
- Biological deterioration of wood
- Methods of preservative application in wood
- Fire retardants and their usage

MODEL QUESTION PAPER

5B07FOR - WOOD PROCESSING, MANUFACTURING OF WOOD PRODUCTS AND WOOD BASED INDUSTRIES

Time: 3 Hrs

Max. Marks: 40

SECTIONA

1. Choose the correct answer **(8 x 0.5 = 4 marks)**
- is the country credited for the discovery of paper manufacture (India, China, Russia, USA)
 - The outer plies in a plywood panel are called as ----- (faces, cores, laps, crosses)
 - Edge grained lumber is produced in soft woods by -----sawing (quarter, rift, plane, slice)
 - is used for sizing of paper (rosin, calcium, chloride, hydrogen)
2. Fill in the blanks
- The width of saw cut is termed as -----
 - is used for production of decorative veneers
 - Two species suitable for veneer production
 - is a manufactured regenerated cellulose fiber

SECTIONB

Write short notes on ANYSEVEN of the following questions **(7 x 2 = 14 marks)**

- Fibre board and particle board
- List out the characteristics that decide the choice of materials for manufacture of paper
- Chemically modified wood
- Different kinds of saws
- Cross banded construction of plywood
- Kraft process
- Compreg
- Urea formaldehyde
- Wood tannins
- Sandwich board and core board

SECTIONC

Answer ANYFOUR of the following questions **(4 x 3 = 12 marks)**

- Wood joints
- Sacharification of wood
- Types of paper
- Wood working
- Natural adhesives used in wood industry
- Dendro-biomass power generation industries

SECTIOND

Write an essay on ANYTWO of the following questions **(2 x 5 = 10 marks)**

- Write an account of manufacturing process of plywood
- Describe briefly about the match manufacturing process of wood. Also mention species suitable for matchwood industries
- Explain the process of production of alcohol from wood
- What are the types of improved wood and explain their manufacturing process

MODEL QUESTION PAPER
5B08FOR - FOREST ECONOMICS AND FOREST STATISTICS

Time: 3 Hrs

Max. Marks: 40

SECTION A

1. Choose the correct answer **(8 x 0.5 = 4 marks)**
- a. If the price elasticity of demand is 1, it is said to be(perfectly elastic, highly elastic, elastic, inelastic)
 - b. The most frequently occurring observation in a frequency distribution is.....(mean, median, mode, standard deviation)
 - c.is referred to as the unit cost of production (Fixed cost, Variable cost, Average cost, Marginal cost)
 - d. The process of re-examining every aspect of a project, before actual implementation is called.....(Project formulation, project evaluation, project appraisal, project implementation)
2. Fill in the blanks
- a. The chance of occurrence of an event is called.....
 - b. The statistical method of obtaining representative data or observations from a population is called.....
 - c. The most common design used in forestry experiments is
 - d. Forestry project is viable if the value of BCR is

SECTION B

Write short notes on **ANYSEVEN** of the following questions

(7 x 2 = 14 marks)

3. Standard deviation
4. Stratified sampling
5. Factors of production
6. Scatter diagram
7. Law of supply
8. Elasticity of demand
9. Bioinformatics
10. Fixed and variable costs
11. CRD
12. Chi square test

SECTION C

Answer **ANYFOUR** of the following questions

(4 x 3 = 12 marks)

13. Measures of central tendency
14. Correlation and types of correlation
15. Factor-factor relationships
16. Normal distribution
17. Transformation of data
18. Contingent valuation method

SECTION D

Write an essay on **ANYTWO** of the following questions

(2 x 5 = 10 marks)

19. Sampling and methods of sampling
20. Describe various experimental designs used in forest statistics
21. Describe a Project cycle
22. Economic valuation of natural resources

MODEL QUESTION PAPER

5B09FOR – FOREST MENSURATION, FOREST SURVEY AND REMOTE SENSING

Time: 3 Hrs

Max. Marks: 40

SECTION A

1. Choose the correct answer **(8 x 0.5 = 4 marks)**
- Breast height form factor is also known as (normal form factor, absolute form factor, artificial form factor, true form factor)
 - Local volume tables are mainly based on (DBH; Height; DBH and Height; DBH, Height and Form of Trees)
 -involves processing of raw satellite image data to correct geometric distortions (image rectification, image enhancement, image classification)
 - of a line is an angle which it makes with some fixed meridians (True meridian, magnetic meridian, azimuth, bearing)
2. Fill in the blanks
- is an instrument used to find the tree height
 - is an instrument used to find the upper stem diameter
 - is an instrument used to find the bark thickness
 - is an instrument used to find the solid volume of wood

SECTION B

Write short notes on ANYSEVEN of the following questions **(7 x 2 = 14 marks)**

- Define forest mensuration. What are the objectives of forest mensuration?
- Advantages and disadvantages of tape in diameter and girth measurement
- Metzger's theory of tree form
- Quarter girth formula
- Determination of age of trees by three periodic measurements
- What are the objectives of forest surveying?
- Importance of maps in forestry
- Characteristics of contour
- Classification of aerial photography
- Components of GIS

SECTION C

Answer ANYFOUR of the following questions **(4 x 3 = 12 marks)**

- Non instrumental methods of tree height measurement
- Volume measurement of branch wood and root wood
- What is meant by volume table? How the volume tables are classified?
- Relationship between CAI and MAI
- Explain the various methods of Plain Table Surveying. What are the practical applications in forestry?
- Write a short note on vegetation mapping and forest cover monitoring using RS and GIS

SECTION D

Write an essay on ANYTWO of the following questions **(2 x 5 = 10 marks)**

- What is meant by breast height measurement? What are the advantages? Explain with supporting diagrams the standard rules governing breast height measurement.
- Derive the formulae to find the height of a tree using trigonometric principles when 1) tree is on a flat ground 2) tree top is above eyelevel and tree base below eyelevel of the observer 3) both tree top and tree base above the eyelevel, and 4) both tree top and tree base are below the eyelevel of the observer
- Give a detailed account on the importance and applications of forest surveying and levelling
- Explain the applications of Remote Sensing and GIS in Forestry

MODEL QUESTION PAPER
5B10FOR – FOREST MANAGEMENT AND UTILIZATION

Time: 3 Hrs

Max. Marks: 40

SECTION A

1. Choose the correct answer **(8 x 0.5 = 4 marks)**
- a. is the increase in growth that takes place in a particular year (CAI, MAI, PAI, Increment Percent)
 - b. The working plan period ranges from to Years (5 to 10 years, 10 to 15 years, 15 to 20 years, 20 to 25 years)
 - c. Gum obtained from *Boswellia serrata*..... (Gum Kino, Bengal Kino, Salai gum, Dhaura gum)
 - d. Quinine obtained from.....(*Cinchona officinalis*, *Rauvolfia serpentina*, *Ephera gerardiana*, *Strychnos nu-vomica*)
2. Give scientific names of the following trees
- a. Bidi leaf tree
 - b. Blue gum
 - c. Khair
 - d. White dammer

SECTION B

Write short notes on **ANYSEVEN** of the following questions **(7 x 2 = 14 marks)**

3. Define Forest Management. What are the objects of forest management?
4. Sustained yield
5. Organization of forest property
6. Causes of abnormality in forests
7. Forest Certification
8. Fibres
9. Ethnobotany
10. Properties and uses of turpentine
11. Animal products
12. Oleoresins

SECTION C

Answer **ANYFOUR** of the following questions **(4 x 3 = 12 marks)**

13. Forest management is an art and science. Justify?
14. Which are the different types of rotation? What are the factors determining the length and choice of rotation?
15. Unique features of forest management when compared to industrial and agricultural management.
16. Botanical name, Family and uses of 3 medicinal plants in Kerala.
17. Dyes and its classification
18. Manufacture of Cutch and Katha

SECTION D

Write an essay on **ANYTWO** of the following questions **(2 x 5 = 10 marks)**

19. Give a comparative account on the National Forest Policies of India
20. Explain in detail about the formulation and drawing of a working plan
21. Write a detailed account on the various NTFPs of Kerala
22. Explain the cultivation of Lac. How shellac is manufactured?

MODEL QUESTION PAPER

6B13FOR - FOREST ENTOMOLOGY, FOREST PATHOLOGY AND FOREST PROTECTION

Time: 3 Hrs

Max. Marks: 40

SECTION A

1. Choose the correct answer **(8 x 0.5 = 4 marks)**
- Hyblaea peurea* attacks the foliage of (sandal, teak, rosewood, mahogany)
 - Termites belong to (Coleoptera, Isoptera, Orthoptera, Hymenoptera)
 - Crop rotation is followed for the management of (air-borne pathogen, soil-borne pathogen, seed-borne pathogen, water-borne pathogen)
 - Shifting cultivation is still practiced in (Kerala, Meghalaya, Karnataka, Bihar)
2. Fill in the blanks
- is an invasive alien species
 - The width of fire line is ----- m
 - Vegetative body of fungus is known as -----
 - Scientific name of silkworm moth is

SECTION B

Write short notes on ANYSEVEN of the following questions **(7 x 2 = 14 marks)**

- Sandal spike disease
- Integrated pest management
- Disease triangle
- Powdery mildew in teak
- Witches broom in deodar
- Give examples of four plant species that can be utilized as bee pasturage
- Phytosanitary certificate
- Symptoms of damage by *Indarbela* spp.
- Fire breaks and fire lines
- Shifting cultivation

SECTION C

Answer ANYFOUR of the following questions **(4 x 3 = 12 marks)**

- Biological control of insect pests
- Beneficial role of insects
- Give an account of insect pests of freshly felled trees
- Measures to control damping off disease
- Types of forest fire
- Rotational and controlled grazing

SECTION D

Write an essay on ANYTWO of the following questions **(2 x 5 = 10 marks)**

- Describe briefly about various methods and of insect pest management
- Discuss about classification of tree diseases
- Modern methods of forest fire management
- Major diseases of Teak - their symptoms, etiology and control measures

MODEL QUESTION PAPER

6B14FOR - ECOTOURISM, URBAN FORESTRY AND LANDSCAPE MANAGEMENT

Time: 3 Hrs

Max. Marks: 40

SECTIONA

1. Choose the correct answer **(8 x 0.5 = 4 marks)**
- The first planned ecotourism destination in India.....(Wayanad, Periyar, Thenmala, Bandipur)
 - Keoladeo National Park is located at.....(West Bengal, Rajasthan, Karnataka, Utharakhand)
 - Practice of pruning the hedges and edges is called.....(Pinching, Stopping, clipping, staking)
 - Example for a species used for ground covering..... (*Phyllanthus myrtifolius*, *Arachis pintoi*, *Ixora chinensis*, *Duranta erecta*)
2. Fill in the blanks
-is a Japanese art form using miniature trees grown in containers
 -is an elevated structure in a garden resembling a mountain or the slope of a hill
 - The term ecotourism was coined by.....
 - Kanha National Park is located in state

SECTIONB

Write short notes on ANYSEVEN of the following questions

(7 x 2 = 14 marks)

- Elements of ecotourism
- Objectives of ecotourism
- Green consumerism
- Forms of ecotourism
- Hedges and edges
- Topiary
- Elements of landscaping
- Urban forestry
- Carrying capacity
- Arches and pergola

SECTIONC

Answer ANYFOUR of the following questions

(4 x 3 = 12 marks)

- Forms and categories of tourism
- Management of Urban forest
- Travel cost method
- Arboriculture and its importance
- Avenue planting
- Principles of landscaping

SECTIOND

Write an essay on ANYTWO of the following questions

(2 x 5 = 10 marks)

- Importance of urban forest and its uses
- Components of landscaping
- Environmental and social impacts of ecotourism
- Ecotourism in important protected areas of India

MODEL QUESTION PAPER
6B15FOR - FOREST GENETICS, TREE IMPROVEMENT AND BIOTECHNOLOGY

Time: 3 Hrs

Max. Marks: 40

SECTIONA

1. Choose the correct answer **(8 x 0.5 = 4 marks)**
- a. Virus free plants can be produced by ----- culture (embryo, meristem, seed, polyploid)
 - b. ----- is start codon (AUG, UUC, AUC, UCA)
 - c. One of these is a restriction enzyme (Ligase, DNA polymerase, RNA polymerase, *Eco* RI)
 - d. Non-coding regions of DNA (Histones, Introns, Exons, Mutons)
2. Fill in the blanks
- a. Triploids can be produced by ----- culture
 - b. RAPD stands for -----
 - c. Alternate form of a gene is termed as -----
 - d. Colchicine is used to induce ----- in plants

SECTIONB

Write short notes on ANYSEVEN of the following questions

(7 x 2 = 14 marks)

3. SPA and SO
4. Clonal forestry
5. Synthetic seeds
6. r DNA technology
7. Chromosome theory of inheritance
8. Multiple alleles
9. SCA and GCA
10. Mutation
11. Haploid culture
12. Provenance testing

SECTIONC

Answer ANYFOUR of the following questions

(4 x 3 = 12 marks)

13. Mendel's principles of heredity
14. Problems of *in vitro* propagation
15. Theories on sex determination
16. Cytoplasmic inheritance
17. What is the significance of back cross breeding
18. Self-incompatibility and its types

SECTIOND

Write an essay on ANYTWO of the following questions

(2 x 5 = 10 marks)

19. Different tissue culture media and their composition
20. Explain different gene interactions with examples
21. Explain the process of meiosis with diagrams
22. Explain the structure of DNA

MODEL QUESTION PAPER
6B16FOR – WILDLIFE SCIENCE AND HUMAN DIMENSIONS

Time: 3 Hrs

Max. Marks: 40

SECTION A

1. Choose the correct answer **(8 x 0.5 = 4 marks)**
- a. is a mechanism for predator avoidance in animals (aestivation, hibernation, torpor, mimicry)
 - b. Diastema is a characteristic feature of (primates, rodents, bats, carnivores)
 - c. The most suitable census method for elephants is (block count, water hole count, dung count, road side count)
 - d. Forest Right Act was enacted in (2002, 2004, 2006, 2008)
2. Name the following
- a. A reptile endemic to Western Ghats
 - b. A mammal of the order Lagomorpha
 - c. A species in schedule VI of Wildlife Protection Act 1972
 - d. The bird migrating longest distance in the world

SECTION B

Write short notes on ANYSEVEN of the following questions **(7 x 2 = 14 marks)**

3. Name four species of mammals and four species of birds endemic to Western Ghats
4. Difference between territory and home range
5. Courtship behaviour
6. What is meant by clutch size and litter size? What are the significances?
7. How the age of maturity can be determined in wild animals?
8. Characteristic features of the order rodentia
9. Nesting behaviour in birds
10. Satellite telemetry tracking
11. Social structure of tribes in India
12. Which are the problems faced by tribes of India

SECTION C

Answer ANYFOUR of the following questions **(4 x 3 = 12 marks)**

13. Classification of vertebrates
14. Write a short note on the learned behaviour in animals
15. Which are the mechanisms for predator avoidance in wild animals?
16. Characteristic features, distribution and representatives of the order primates.
17. Salient features of wildlife Protection Act 1972. Which are the schedules?
18. Give a brief account on the tribal economy. What are roles of NWFP in tribal economy?

SECTION D

Write an essay on ANYTWO of the following questions **(2 x 5 = 10 marks)**

19. Write an essay on bird migration – the reasons, patterns and mechanisms.
20. Give a detailed account on the wildlife census techniques
21. What are the major threats to wildlife? Explain the conservation measures of wildlife.
22. Explain in detail about the forest policies and other legal provisions to safe guard tribal interests in India.

MODEL QUESTION PAPER
5D01FOR - ECOTOURISM

Time: 2Hrs

Max. Marks: 20

SECTIONA

1. Choose the correct answer **(4 x 0.5 = 2 marks)**
- a. The word Ecotourism was coined by..... (Lascurian, Mc Kercher, Levitt, Lindberg)
 - b. First planned ecotourism destination in India.....(Neyyar, Waynad, Thenmala, Periyar)
 - c. Keoladeo National Park is located in.....(Bihar, Utharakhand, Madhya Pradesh, Rajasthan)
 - d. Ecotourism is a..... tourism (Leisure, Cultural, Nature based, Adventure)

SECTIONB

Write short notes on ANYFOUR of the following questions

(4x 2 = 8 marks)

2. Elements of ecotourism
3. Ecotourism business plan
4. Forms of tourism
5. Mass tourism
6. Sunderbans Tiger Reserve
7. Green consumerism
8. Hard and soft ecotourism

SECTIONC

Answer ANYTWO of the following questions

(2 x 3 = 6 marks)

9. Types of Carrying capacity
10. Objectives of ecotourism
11. Role of NGO's in ecotourism
12. Basic components of tourism

SECTIOND

Write an essay on ANYONE of the following questions

(1 x 4 = 4marks)

13. Give an account on the impacts of ecotourism to the environment
14. Travel cost method
15. Write an account on ecotourism in any 4 protected areas of India

MODEL QUESTION PAPER
5D02FOR – BIODIVERSITY CONSERVATION

Time: 2Hrs

Max. Marks: 20

SECTIONA

1. Choose the correct answer (4 x 0.5 = 2 marks)
- Convention on Biodiversity was held in the year (1972, 1982, 1992, 2002)
 - Biosphere Reserves are declared by (IUCN, WWF, MoEF, UNESCO)
 - National Biodiversity Authority is situated at (Kolkatta, Hyderabad, Chennai, Mumbai)
 - Biological Diversity Act was enacted in the year (2000, 2002, 2004, 2006)

SECTIONB

Write short notes on **ANYFOUR** of the following questions (4x 2 = 8 marks)

- Define biodiversity. Which are the levels of biodiversity?
- Hot spots of biodiversity
- Biosphere reserves
- Difference between wildlife sanctuary and national park
- Project tiger
- Biodiversity register
- Difference between *insitu* and *exsitu* conservation measures

SECTIONC

Answer **ANYTWO** of the following questions (2 x 3 = 6 marks)

- Write a short note on Western Ghats. Name four mammals endemic to Western Ghats.
- Ethics in conservation
- IUCN redlist categories and criteria
- What is meant by Intellectual Property Rights? Which are the categories? Name four GI products from Kerala

SECTIOND

Write an essay on **ANYONE** of the following questions (1 x 4 = 4marks)

- Explain the uses and values of biodiversity
- India is a mega biodiversity nation – justify?
- Give a brief account on the distribution and characteristic features of biogeographic zones of India.

MODEL QUESTION PAPER
5D03FOR – LANDSCAPING AND ORNAMENTAL GARDENING

Time: 2Hrs

Max. Marks: 20

SECTIONA

1. Choose the correct answer **(4 x 0.5 = 2 marks)**
- a. Bridges are the special features ofgarden (Persian, Mughal, Japanese, English)
 - b. The quickest method of developing lawns.....(Seed sowing, Dibbling, Spreading offshoots, Turfing)
 - c. The principle of design in which an object repeats at equidistance.....(Balance, Proportion, Rhythm, Accent)
 - d. Which of the following is an indoor garden(Bog garden, Terrace garden, Rockery, Terrarium)

SECTIONB

Write short notes on ANYFOUR of the following questions **(4x 2 = 8 marks)**

2. Urban forestry
3. Topiary
4. Hedges and edges
5. Significance of pergolas
6. Features of English garden
7. Butterfly garden
8. Importance of flowerbeds

SECTIONC

Answer ANYTWO of the following questions **(2 x 3 = 6 marks)**

9. Styles of garden
10. Importance of arboriculture
11. Principle of Landscaping
12. Avenue planting

SECTIOND

Write an essay on ANYONE of the following questions **(1 x 4 = 4marks)**

13. Explain various types of Japanese gardens
14. Discuss various landscape components
15. What are the engineering, architectural and aesthetic uses of Urban forest

MODEL QUESTION PAPER

4B06FOR - CORE PRACTICAL – I

Time: 3 Hrs

Max. Marks: 48

-
1. Find out the IVI of all the species from the given data. Draw a polygraph of the species having maximum IVI. Calculations – 3 Result – 2 Graph – 2 (8 marks)
 2. Take a VS of the flower A. Construct a floral diagram and floral formula
VS diagram – 2 Floral Diagram – 2 Formula – 1 (5 marks)
 3. Systematic position and spot characters of the given specimens B and C (2x3=6marks)
 4. Write the procedure of the experiment D (3 marks)
 5. Identify the arrangement of the apparatus E. Give the aim and procedure
Identification – 1 Writings – 2 (3 marks)
 6. Identify the specimen F and write the procedure
Identification – 1 Procedure – 2 (3 marks)
 7. Find out the specific gravity of the given wood specimen
Activity and Readings – 1 calculation and result – 1 (2 marks)
 8. Workout and solve problem G (2 marks)
 9. Spot H, I, J, K, on the given Map (2 marks)
 10. Identify specimen L and M, and write short notes.
Identification – 1 Note – 1 (2x2 = 4 marks)
 11. Identify and write the use N and O
Identification – 1 Use – 1 (2x2 = 4marks)
 12. Spot at sight P, Q, R, S (4x0.5 = 2 marks)
- Viva-voce (4 marks)

Keytothespecimens

A – Flower of any family given in the syllabus

B, C – Campus plants

D – Estimation of soil organic carbon / Nitrogen / Phosphorus / Potassium

E – Tree physiology experiment

F – Small clear specimen for wood mechanical test

G – Problems on spacing/no. of plants per spacing/nursery and plantation area/seed requirement

H, I, J, K, – Protected areas (WLS/NP)

L, M – Wood defects

N, O – Meteorology instruments

P, Q – Forest Tree Seeds

R, S – Herbarium sheets

MODEL QUESTION PAPER

5B11FOR - CORE PRACTICAL II

Time: 3 Hrs

Max. Marks: 48

1. Prepare an ANOVA table for the given data, calculate the LSD and give your conclusions at 5% or 1% significance level
Calculations – 2 ANOVA Table – 2 LSD – 2 Conclusion - 2 (8 marks)
2. Test the significant difference between the samples based on the given data A
Identification of the Test – 1 Calculation – 3 Conclusion – 1 (5 marks)
3. Derive the formula to find the height of the tree in B and C
Diagram – 1 Labelling – 1 Derivation – 1 (2x3=6 marks)
4. Workout and solve problem D
Calculation - 3 Conclusion - 1 (4 marks)
5. Identify the instrument E. Write the use and working
Identification – 1 Writings – 2 (3 marks)
6. Workout and solve problem F (3 marks)
7. Draw a diagram G for the given data (2 marks)
8. Identify the specimens H and I, and write short notes.
Identification – 1 Note – 1 (2x2 = 4 marks)
9. Identify and write the uses of J and K
Identification – 1 Uses – 1 (2x2 = 4 marks)
10. Spot at sight L, M, N, O, P (5x1 = 5 marks)
Viva-voce (4 marks)

Keytothespecimens

- A – Statistical data for Z test/independent t test/paired t test/chi square test
- B, C – if the tree is on flat ground / if tree top above the eye level and tree base below the eye level of the observer / if both tree top and tree base below the eye level / if both the tree top and tree base above the eye level of the observer
- D – Problems on Forest Economics - NPV/BC ratio/IRR
- E – Mensuration instruments
- F – Problem related to forest survey
- G – Histogram/Bar diagram/Line Diagram/Pie Diagram/Frequency Polygon
- H, I – wood products
- J, K – Non timber forest products
- L, M, N, O, P – Instruments and other articles related to Forest Mensuration, wood and non-wood forest products, surveying, RS and GIS

MODEL QUESTION PAPER

6B17FOR - CORE PRACTICAL III

Time: 3 Hrs

Max. Marks: 48

1. Prepare an acetocarmine squash of the given root tip. Identify two clear stages of mitotic divisions with reasons, draw a labeled diagram of each stage and report for valuation
Preparation-3 Identification-1 Reason-2 Diagram-2 (8 marks)
 2. Analyse qualitatively the given sample A. Report the results and write the procedure.
Analysis – 2 Result – 2 Procedure - 2 (6 marks)
 3. Demonstrate grafting/budding on the given twig. Write the procedure with diagram.
Demonstration – 2 Procedure – 2 Diagram – 2 (6 marks)
 4. Workout and solve problem B (4 marks)
 5. Identify the specimens C and D. Write short notes
Identification – 1 Notes – 2 (2x3=6marks)
 6. Workout and solve problem E (2 marks)
 7. Name two species each suitable for F and G (2x1 = 2 marks)
 8. Write the common name and order of H, I, J, K (4x1 = 4 marks)
 9. Identify giving scientific name and order of the specimen L. Write the nature of damage
Identification – 1 Nature of damage – 1 (2 marks)
 10. Spot at sight M, N, O, P (4x1 = 4 marks)
- Viva-voce (4 marks)

Keytothespecimens

A – Glucose/Fructose/Sucrose/Starch/Lactose/Maltose/Protein

B – Genetics problem

C, D – Diseased plant specimen/Pathogenic structure/Insect or Fungus attacked specimen

E – Carrying capacity of an ecotourism site

F, G – plants for hedge/edge/topiary/shrubbery/lawn/pergola/arch

H, I, J, K – Pictures of common birds

L – Insect pest of forest trees / Nursery

M, N, O, P – spotters related to the topics in the syllabus

APPENDIX I

Format of Title Page of Assignment/Seminar Report

ASSIGNMENT/SEMINAR REPORT ON

Submitted in the partial fulfilment of the requirement for the

Course:

Course Teacher:

Submitted by

Name:

Roll No. :

Date of submission:



DEPARTMENT OF FORESTRY
SIR SYED COLLEGE
KARIMBAM P.O., THALIPARAMBA
KANNUR-670142

APPENDIX II
Format of the Title Page of Project Report

**DOCUMENTATION OF WILD EDIBLE PLANTS USED BY
KADAR TRIBES OF VAZHACHAL FOREST DIVISION**

BY

SUGIYA N

DISSERTATION

**Submitted to the Kannur University in partial fulfillment of the
requirements for the degree of**

**Bachelor of Science
in
Forestry**



**DEPARTMENT OF FORESTRY
SIR SYED COLLEGE
THALIPARAMBA
KANNUR-670142**

2013

APPENDIX III

Format of the Title Page of the Report on Forestry Field Experience

**REPORT ON
FORESTRY FIELD EXPERIENCE**

By

ASWIN K.

**Submitted to the Kannur University in partial fulfillment of the
requirements for the degree of**

**Bachelor of Science
in
Forestry**



**DEPARTMENT OF FORESTRY
SIR SYED COLLEGE
THALIPARAMBA
KANNUR - 670142**

2014