



KANNUR UNIVERSITY

(Abstract)

B.Sc.Forestry Programme-Scheme, Syllabus and Pattern of Question Papers of Core and Generic Elective Course under Choice Based Credit and Semester System (Outcome Based Education System-OBE) in Affiliated colleges with effect from 2019 Admission-Implemented-Orders issued.

Academic Branch

No.Acad.C2/12529/2019

Civil Station P.O Dated 21 /06/2019

- Read:-
1. U.O.No.Acad.C2/429/2017 dated 10-10-2017
 2. The Minutes of the Meeting of the Curriculum Restructuring Committee held on 28-12-2018.
 3. U.O No. Acad.C2/429/2017 Vol.II dated 03-06-2019
 4. The Minutes of the Meeting of the Board of Studies in B.Sc.Forestry held on 06/06/2019
 5. Syllabus of B.Sc. Forestry Course Submitted by the Chairperson, Board of Studies in Forestry (Cd) dated 15/06/2019

ORDER

1. A Curriculum Restructuring Committee was constituted in the University vide the paper read (1) above to co-ordinate the activities of the Syllabus Revision of UG programmes in Affiliated colleges of the University.

2. The meeting of the Members of the Curriculum Restructuring Committee and the Chairpersons of different Boards of Studies held, vide the paper read (2) above, proposed the different phases of Syllabus Revision processes such as conducting the meeting of various Boards of Studies , Workshops and discussion.

3. The Revised Regulation for UG Programmes in Affiliated colleges under Choice Based Credit and Semester System (in OBE-Outcome Based Education System) was implemented with effect from 2019 Admission as per paper read (3) above.

4. Subsequently, as per paper read (4) above, the Board of Studies in Forestry (Cd) finalized the Scheme, Syllabus & Pattern of Question Paper for Core & Generic Elective Course of B.Sc. Forestry Programme to be implemented with effect from 2019 Admission.

5. As per paper read (5) above, the Chairperson, Board of Studies in Forestry (Cd) submitted the finalized copy of the Scheme, Syllabus & Pattern of Question Papers of B.Sc. Forestry Programme for implementation with effect from 2019 Admission.

6. The Vice Chancellor after considering the matter in detail and in exercise of the powers of the Academic Council conferred under Section 11(1) of Kannur University Act 1996 and all other enabling provisions read together with accorded sanction to implement the Scheme, Syllabus & Pattern of Question Paper(Core/ Generic Elective Course) of B.Sc. Forestry programme under Choice Based Credit and Semester System(in OBE-Outcome Based Education System) in the Affiliated colleges under the University with effect from 2019 Admission, subject to reporting to the Academic Council.

7. The Scheme, Syllabus & Pattern of Question Paper of B.Sc. Forestry Programme are uploaded in the University website (www.kannuruniversity.ac.in)

Orders are issued accordingly.

Sd/-
DEPUTY REGISTRAR (ACADEMIC)
For REGISTRAR

To

The Principals of Colleges offering B.Sc. Forestry programme

- Copy to: -
1. The Examination Branch (through PA to CE)
 2. The Chairperson, Board of Studies in Forestry (Cd)
 3. PS to VC/PA to PVC/PA to Registrar
 4. DR/AR-I, Academic
 5. The Computer Programmer (for uploading in the website)
 6. SF/DF/FC

Forwarded/By Order



SECTION OFFICER





KANNUR UNIVERSITY

**UNDER GRADUATE PROGRAMME
IN
FORESTRY**

**SYLLABUS FOR B.Sc FORESTRY –CORE AND
GENERIC ELECTIVE COURSE**

CHOICE BASED CREDIT AND SEMESTER SYSTEM

(2019 ADMISSION ONWARDS)

ANNEXURE (i)
KANNUR UNIVERSITY
VISION AND MISSION STATEMENTS

Vision: To establish a teaching, residential and affiliating University and to provide equitable and just access to quality higher education involving the generation, dissemination and a critical application of knowledge with special focus on the development of higher education in Kasargode and Kannur Revenue Districts and the Manandavady Taluk of Wayanad Revenue District.

Mission:

- To produce and disseminate new knowledge and to find novel avenues for application of such knowledge.
 - To adopt critical pedagogic practices which uphold scientific temper, the uncompromised spirit of enquiry and the right to dissent.
 - To uphold democratic, multicultural, secular, environmental and gender sensitive values as the foundational principles of higher education and to cater to the modern notions of equity, social justice and merit in all educational endeavours.
 - To affiliate colleges and other institutions of higher learning and to monitor academic, ethical, administrative and infrastructural standards in such institutions.
 - To build stronger community networks based on the values and principles of higher education and to ensure the region's intellectual integration with national vision and international standards.
 - To associate with the local self-governing bodies and other statutory as well as non-governmental organizations for continuing education and also for building public awareness on important social, cultural and other policy issues.
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KANNUR UNIVERSITY

UG PROGRAMME OUTCOMES

PO1. Critical Thinking:

1. Acquire the ability to apply the basic tenets of logic and science to thoughts, actions and interventions.
2. Develop the ability to chart out a progressive direction for actions and interventions by learning to recognize the presence of hegemonic ideology within certain dominant notions.
3. Develop self-critical abilities and also the ability to view positions, problems and social issues from plural perspectives.

PO2. Effective Citizenship:

1. Learn to participate in nation building by adhering to the principles of sovereignty of the nation, socialism, secularism, democracy and the values that guide a republic.
2. Develop and practice gender sensitive attitudes, environmental awareness, the ability to understand and resist various kinds of discriminations and empathetic social awareness about various kinds of marginalisation.
3. Internalise certain highlights of the nation's and region's history. Especially of the freedom movement, the renaissance within native societies and the project of modernisation of the post-colonial society.

PO3. Effective Communication:

1. Acquire the ability to speak, write, read and listen clearly in person and through electronic media in both English and in one Modern Indian Language
2. Learn to articulate analysis, synthesis, and evaluation of situations and themes in a well-informed manner.
3. Generate hypothesis and articulate assent or dissent by employing both reason and creative thinking.

PO4. Interdisciplinarity:

1. Perceive knowledge as an organic comprehensive, interrelated and integrated faculty of the human mind
2. Understand the issues of environmental contexts and sustainable development as a basic interdisciplinary concern of all disciplines.
3. Develop aesthetic, social, humanistic and artistic sensibilities for problem solving and evolving a comprehensive perspective.

KANNUR UNIVERSITY

B.Sc. Forestry Programme

Bachelor of Science in Forestry (B.Sc. Forestry), an undergraduate programme under the Faculty of Science of Kannur University, consists of Forestry as core subject with two complementary elective subjects. The duration of the programme is six semesters distributed in a period of three years.

Programme Specific Outcomes (PSO) of B.Sc. Forestry

After successful completion of three year degree program in Forestry, a student should be able

- PSO1** : Develop the skills of art and science of forest management
- PSO2** : Generate the spirit and understand the measures of conservation of forests, biodiversity and natural resources
- PSO3** : Develop the skills for cultivation of forest trees, afforestation and ecological restoration
- PSO4** : Understand and develop the techniques of harvesting and utilization of forest resources in a sustainable manner
- PSO5** : Create knowledge base regarding the legislative measures for protection of forests and wildlife and to safeguard tribal interests
- PSO6** : Develop skill for improvement and conservation of forest genetic resources
- PSO7** : Develop positive and sustainable vision in utilizing forests to beat the threats including global climate change.

COURSES

The number of courses required to complete the programme shall be 40. 'Course' means a segment of subject matter to be covered in a semester (traditionally referred to as paper). The courses include English Common Course, Additional Common Course, General Awareness Course, Complementary Elective Courses, Core Course and Generic Elective Course.

'**Common English Course**' means compulsory English courses (two courses each in first and second semesters).

'**Additional Common Courses**' are language courses selected by the student as his/her own choice. (one course each in first and second semesters).

'General Awareness Courses' are course offered for LRP (Language Reduced Pattern) programmes. General awareness courses are offered in third and fourth semesters. The syllabi of general awareness courses include the topics related to forestry.

'Complementary Elective Course' means a course which is generally related to the core course. There are two Complementary Elective Course for BSc. Forestry programme viz. Chemistry and Botany. Complementary Elective Course 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 14 theory courses, 3 practical courses and 1 field experience course.

'Generic Elective Course' means a course which can be opted by a student at his/her choice. There shall be one Generic Elective Course in core subjects in the fifth semester. Each department can decide the Generic Elective Course from a pool of five courses offered by the university.

The breakup of the courses is as follows;

Common English Course	- 4
Additional Common Course	- 2
General Awareness Courses	- 5
Complementary Elective Course I	- 5
Complementary Elective Course II	- 5
Core Courses	- 18
Generic Elective Course	- 1
Total	40

COURSE CODE

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 English Courses/Additional Common Course/General Awareness Course (Code A), Core courses (Code B), Complementary Elective Course (Code C) and Generic Elective 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.

PROGRAMME STRUCTURE (B.Sc. Forestry)

SEMESTER 1

No.	Course	Credits	Hours/ Week	Total Marks		
				Int.	Ext.	Total
1	Common English Course 1	4	5	10	40	50
2	Common English Course 2	3	4	10	40	50
3	Additional Common Course 1	4	5	10	40	50
4	Core Course 1: 1B01FOR	3	2+1	10	40	50
5	First complementary Elective 1	2	2 + 2	8	32	40
6	Second complementary Elective 1	2	2 + 2	8	32	40
Total		18	25	280		

SEMESTER 2

No.	Course	Credits	Hours/ Week	Total Marks		
				Int.	Ext.	Total
1	English Common Course 3	4	5	10	40	50
2	English Common Course 4	3	4	10	40	50
3	Additional Common Course 2	4	5	10	40	50
4	Core Course 2: 2B02FOR	3	2+1	10	40	50
5	First complementary Elective 2	2	2 + 2	8	32	40
6	Second complementary Elective 2	2	2 + 2	8	32	40
Total		18	25	280		

SEMESTER 3

No.	Course	Credits	Hours/ Week	Total Marks		
				Int.	Ext.	Total
1	General Awareness Course 1: 3A11FOR	3	3+1	8	32	40
2	General Awareness Course 2: 3A12FOR	3	2+1	8	32	40
3	Core Course 3:3B03FOR	3	2+1	10	40	50
4	Core Course 4: 3B04FOR	3	3+2	10	40	50
5	First complementary Elective 3	2	3 + 2	8	32	40
6	Second complementary Elective 3	2	3 + 2	8	32	40
Total		16	25	260		

SEMESTER 4

No.	Course	Credits	Hours/ Week	Total Marks		
				Int.	Ext.	Total
1	General Awareness Course 3: 4A13FOR	3	3+2	8	32	40
2	General Awareness Course 4: 4A14FOR	3	3+2	8	32	40
3	Core Course 5: 4B05FOR	3	3+2	10	40	50
4	First complementary Elective 4	2	3 + 2	8	32	40
5	Second complementary Elective 4	2	3 + 2	8	32	40
6	General Awareness Practical: 4A15FOR	4	-	8	32	40
7	Core Practical 1: 4B06FOR	4	-	10	40	50
8	First complementary Elective Practical	4	-	8	32	40
9	Second complementary Elective Practical	4	-	8	32	40
Total		29	25	380		

SEMESTER 5

No.	Course	Credits	Hours/ Week	Total Marks		
				Int.	Ext.	Total
1	Core Course 7: 5B07FOR	3	4+2	10	40	50
2	Core Course 8: 5B08FOR	3	3+2	10	40	50
3	Core Course 9: 5B09FOR	3	4+2	10	40	50
4	Core Course 10: 5B10FOR	3	4+2	10	40	50
5	Generic Elective Course	2	2	5	20	25
Total		14	25	225		

SEMESTER 6

No.	Course	Credits	Hours/ Week	Total Marks		
				Int.	Ext.	Total
1	Core Course 11: 6B11FOR	3	3+1	10	40	50
2	Core Course 12: 6B12FOR	3	4+2	10	40	50
3	Core Course 13: 6B13FOR	3	4+2	10	40	50
4	Core Course 14: 6B14FOR	3	4+2	10	40	50
5	Core Practical II: 6B15FOR	4	-	10	40	50
6	Core Practical III: 6B16FOR	4	-	10	40	50
7	Forestry Field Experience	3	-	10	40	50
8	Project	2	3	5	20	25
Total		25	25	375		

Total Credits: 120**Total Marks: 1800**

First complementary Elective: CHEMISTRY

Second complementary Elective: BOTANY

BSc. FORESTRY PROGRAMME - SCHEME OF CORE AND GENERAL AWARENESS COURSES
(2019 admission onwards)

Sem.	Course code	Course title	Credit	Hours/Week		Total marks
				Theory	Practical	
I	1B01FOR	Forests, Forestry and Biodiversity	3	2	1	50
II	2B02FOR	Forest Ecology and Dendrology	3	2	1	50
III	3B03FOR	Principles and Practices of Silviculture	3	2	1	50
III	3B04FOR	Treephysiology and Forest Seed Technology	3	3	2	50
III	3A11FOR	Fundamentals of Wildlife Science and Conservation Biology	3	3	1	40
III	3A12FOR	Anatomy, Structure and Properties of Wood	3	2	1	40
IV	4A13FOR	Agroforestry, Social Forestry and Human Dimensions	3	3	2	40
IV	4A14FOR	Soil Science, Hydrology and Watershed Management	3	3	2	40
IV	4B05FOR	Silviculture Systems, Silviculture of Indian trees and Plantation Forestry	3	3	2	50
IV	4B06FOR	Core Practical – I	4	-	-	50
IV	4A15FOR	General Practical –I	4	-	-	40
V	5B07FOR	Forest Resource Utilization and Wood Based Industries	3	4	2	50
V	5B08FOR	Forest Survey and Geoinformatics	3	3	2	50
V	5B09FOR	Forest Mensuration and Forest Management	3	4	2	50
V	5B10FOR	Forest Genetics, Tree Improvement and Biotechnology	3	4	2	50
VI	6B11FOR	Ecotourism, Urban Forestry and Landscape Management	3	3	1	50
VI	6B12FOR	Forest Economics and Forest Statistics	3	4	2	50
VI	6B13FOR	Forest Entomology, Wildlife Management and Forest Protection	3	4	2	50
VI	6B14FOR	Forest Pathology, Wood Degradation and Wood Preservation	3	4	2	50
VI	6B15FOR	Core Practical – II	4	-	-	50
VI	6B16FOR	Core Practical – III	4	-	-	50
VI	6B17FOR	Forestry Field Experience	3	-	-	50
VI	6B18FOR	Project	2	3	-	25

BSc. FORESTRY PROGRAMME - SCHEME OF GENERIC ELECTIVE COURSES

(2019 admission onwards)

Sem.	Course code	Course title	Credit	Hours/Week		Total marks
				Theory	Practical	
V	5D01FOR	Ecotourism	2	2	-	25
V	5D02FOR	Biodiversity Conservation	2	2	-	25
V	5D03FOR	Landscaping and Ornamental Gardening	2	2	-	25
V	5D04FOR	Climate Change Impact and Mitigation	2	2	-	25
V	5D05FOR	Ornithology and Bird Watching	2	2	-	25

CREDITS

Each course shall have certain credits. For passing the BSc. Forestry programme the student shall be required to achieve total 120 credits. The distribution of credits for various courses is given below.

Credit distribution of BSc. Forestry programme

Sem.	Common		General Awareness	Core Forestry	Complementary Elective Course		Generic Elective	Total
	English	Addl.			I	II		
I	4 +3	4		3	2	2		18
II	4 +3	4		3	2	2		18
III			3+3	3+3	2	2		16
IV			3+3+4	3+4	4+2	4+2		29
V				3+3+3+3			2	14
VI				3+3+3+3+3+4+4+2				25
Total	14	8	16	56	12	12	2	120

EVALUATION PROCESS

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 external evaluation. The format of the title page of assignment /seminar report is given in Appendix I

PROJECT WORK

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

FORESTRY FIELD EXPERIENCE

Each student shall undergo field training in forestry under the supervision of a faculty member as per the curriculum in sixth 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, shall be evaluated by the external examiner appointed. The format of the title page of the Report is given in Appendix III

PRACTICAL 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 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 - 20% Weight
- b) External Evaluation - 80% Weight

The distribution of marks for each course is given below.

Scheme of mark distribution of BSc. Forestry programme

Courses		No. of courses	Marks per course			Total Marks
			Internal	External	Total	
Common	English	4	10	40	50	200
	Additional	2	10	40	50	100
General Awareness	Theory	4	8	32	40	200
	Practical	1	8	32	40	
Complementary Elective	I (Botany)	5	8	32	40	200
	II (Chemistry)	5	8	32	40	200
Core	Theory	13	10	40	50	650
	Practical	3	10	40	50	150
	Project	-	5	20	25	25
	Forestry Field Experience	-	4	10	40	50
Generic 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 and assignments/ seminars/ Viva in respect of theory courses and records, submissions and test paper in respect of practical courses. Components with percentage of marks of Internal Evaluation of Theory and Practical Courses are given below.

THEORY COURSES		PRACTICAL COURSES	
COMPONENT	WEIGHTAGE	COMPONENT	WEIGHTAGE
Test paper	80	Test Paper	50
Assignment / Seminar	20	Practical Record and Submissions	50
TOTAL	100	TOTAL	100

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

External Evaluation

Each student should go through the evaluation process according to the Kannur University Regulations for UG Students, 2019. External evaluation carries 80% of marks. The Scheme of Examinations and Model Question Papers of all the theory and practical courses offered under core, General Awareness and Generic Elective courses are given along with the course contents of each course.

Project Evaluation

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

- Internal Assessment (supervising teachers will assess the project and award internal Marks)
- 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 shall be taken as below.

Internal(20% of the total)			External(80% of Total)		
Components	% of Marks	Marks	Components	%of Marks	Marks
Literature Review/Field Work/Use of Data	20	1	Relevance of the Topic,Statement of objectives,Methodology, Reference	25	5
Project Report	40	2	Quality of Analysis/Use of statistical tools,Findings and Recommendations	25	5
Presentation & Viva-Voce	40	2	Viva-Voce	50	10
Total	100	5	Total	100	20

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 shall be re-done and the report should 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)			External(80% ofTotal)		
Components	% of Marks	Marks	Components	%of Marks	Marks
Field Involvement	50	2	Report	70	10
Field Diary	50	2	Viva-voce	30	6
Total	100	4	Total	100	16

Pass Conditions: Submission of the Field Diary, Report and presence of the student for viva-voce 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 must be re-done and the report should be re-submitted along with subsequent exams through parent department.



KANNUR UNIVERSITY

SCHEME, SYLLABUS AND MODEL QUESTION PAPERS OF

CORE AND GENERAL AWARENESS COURSES

OFFERED UNDER

BSc. FORESTRY PROGRAMME

(2019 Admission onwards)

CORE COURSE 1- FORESTS, FORESTRY AND BIODIVERSITY

Semester	Course Code	Hours per week	Credit	Exam Hours
I	1B01FOR	2+1	3	3

Course Outcomes

1. Basic knowledge on the biomes of the world and the characteristics of temperate and tropical forests.
2. Learn the various definitions of forest and the methods of classification of forests.
3. Understand history and development of Indian forestry, branches of forestry and systems of classification of forest types.
4. Analyse state of the forests at global, Indian and Kerala scenario.
5. Awareness on importance of forests and the threats faced by forests including global climate change.
6. Understand biodiversity, its uses, values and levels.
7. Understand the legal and institutional measures to safeguard Indian biodiversity.
8. Basic skills in measurement of biodiversity of an area and acquaintance with biodiversity register.
9. Knowledge on Intellectual Property Rights and GI products with special reference to Kerala.

Module I: FORESTS

(10Hrs)

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: FORESTRY

(5Hrs)

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.

Module III: STATE OF THE FORESTS

(9Hrs)

State of the forests – global, Indian and Kerala scenario. 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. 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.

Module IV: BIODIVERSITY

(12Hrs)

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 forests and 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.

PRACTICALS**(1Hr/Week)**

1. Visit a forest area, identify the forest type(s) and study the forest composition
2. Survey the trees/butterflies/birds of the campus and workout diversity indices viz. Simpson's Index, Shannon-Weiner Index, Berger Parker Dominance Index and Similarity indices.
3. Visit minimum five homegardens and prepare a model biodiversity register. Document the associated traditional knowledge.
4. Map the biogeographic zones of India.

BOOKS FOR REFERENCE

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Marks Including Choice

Unit	Marks
Module I	12
Module II	8
Module III	15
Module IV	25

KANNUR UNIVERSITY FIRST SEMESTER BSc DEGREE EXAMINATION
1B01FOR: FORESTS, FORESTRY AND BIODIVERSITY

TIME: 3Hrs

MAXIMUM MARKS: 40

Part A - Short answer Questions ***Answer All***

(6 X 1 = 6)

1. Define forestry
2. Scientific names of two mangrove species
3. Expand ICFRE
4. Ecological definition of forest
5. Define biodiversity
6. Two GI products from Kerala

Part B- Short Essay Questions ***Answer Any Six***

(6 x 2=12)

7. Temperate coniferous forests
8. Classification of forests based on composition
9. Carbon sequestration
10. Geographical Indication
11. Types of grasslands
12. Name the forest types of Kerala
13. Traditional Knowledge
14. Shola forests

Part C- Essay Questions ****Answer Any Four***

(4 x 3=12)

15. Branches of forestry
16. Levels of biodiversity
17. Tropical rain forests
18. India is a mega biodiversity nation – justify?
19. Peoples' biodiversity register
20. Role of forests in climate change mitigation

Part D- Long Essay* Questions ***Answer Any Two***

(2 x 5=10)

21. Champion and Seth revised classification of forest types of India
22. Uses and values of biodiversity
23. Distribution, species composition and characteristic features of evergreen forests
24. Detailed account on biogeographic zones of India

CORE COURSE 2- FOREST ECOLOGY AND DENDROLOGY

Semester	Course Code	Hours per week	Credit	Exam Hours
II	2B02FOR	2+1	3	3

Course outcomes

1. Understand the structure and function of an ecosystem
2. Understand the concepts in population and community ecology
3. Determine the characteristics of a forest community
4. Explain the models and theories in ecological succession
5. Identify the selected tree families based on spot characters
6. Prepare the key and flora of an area

Module I: Ecosystem and Ecology

(10Hrs)

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, ecotone and edge effect. Forest Ecology – Forest ecosystem, structure and dynamics. Horizontal and vertical stratification. Formation of forest communities – consociation and association.

Module II: Ecological Succession

(6Hrs)

Ecological succession- Autogenic and Allogenic, primary and secondary, Xerarch, Hydrarch, causes of succession, Forest succession and climax vegetation types. Mangrove succession, Succession theories- Monoclimax, Polyclimax, Mosaic theory, Models of succession, Productivity of forests.

Module III: Dendrology

(20Hrs)

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. Role of vegetative morphology in the identification of trees - bole, bark, blaze, exudations, leaves and glands

Systematic position, diagnostic features, floral formula, economic importance and important members of major angiosperm families – Annonaceae, Dipterocarpaceae, Tiliaceae, Meliaceae, Rutaceae, Anacardiaceae, Myrtaceae, Leguminosae (Fabaceae, Caesalpiniaceae, Mimosaceae), Rhizophoraceae, Apocynaceae, Bignoniaceae, Verbenaceae, Casuarinaceae.

PRACTICALS

(1Hr/Week)

1. Vegetation sampling – quadrat method
2. Vegetation sampling – transect method
3. Determination of Importance Value Index
4. Create profile diagram for an ecosystem
5. Techniques of preparing herbarium specimens.
6. Preparation of Keys for the trees of campus/botanical garden
7. Spot characters and floral features of families Annonaceae

8. Spot characters and floral features of families Tiliaceae
9. Spot characters and floral features of families Anacardiaceae
10. Spot characters and floral features of families Leguminosae(Fabaceae, Caesalpiniaceae, Mimosaceae)
11. Spot characters and floral features of families Apocynaceae
12. Spot characters and floral features of families Bignoniaceae
13. Spot characters and floral features of families Verbenaceae

Books for Reference

- 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
- 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 SnehLata. 2005. *Taxonomy- 1 (Systematics and Morphology)*. Sonali Publications. 340 p
- Johri, R. M and SnehLata. 2005. *Taxonomy- 2 (Polypetalae)*. Sonali Publications. 300 p
- Johri, R. M and SnehLata. 2005. *Taxonomy- 3 (Gamopetalae)*. Sonali Publications. 190 p

Marks Including Choice

Unit	Marks
Module I	21
Module II	15
Module III	24

KANNUR UNIVERSITY SECOND SEMESTER BSc DEGREE EXAMINATION

2B02FOR - FOREST ECOLOGY AND DENDROLOGY

TIME: 3Hrs

MAXIMUM MARKS: 40

Part A - Short answer Questions **Answer All**

(6 X 1 = 6)

1. Define Ecosystem
2. Define Ecology
3. Define Food chain
4. Define Succession
5. Define Ecotone
6. List out the two trees of Family Verbenaceae

Part B- Short Essay Questions **Answer Any Six**

(6 x 2=12)

7. Compare detritus and grazing food chain
8. Ecological pyramids
9. Levels of biological organisation
10. Primary and secondary succession
11. Spot characters of family Rutaceae
12. Climatic climax and edaphic climax
13. Law of ten percent
14. Economic importance of family Apocynaceae

Part C- Essay Questions ***Answer Any Four**

(4 x 3=12)

15. Ecological pyramids
16. Vertical stratification of forest
17. Succession models
18. Plant phyllotaxy
19. Principles of ICBN
20. Role of vegetative morphology in tree identification

Part D- Long Essay* Questions **Answer Any Two**

(2 x 5=10)

21. Describe Bentham and Hooker classification in detail, with advantages and disadvantages
22. Describe the characteristics of a biotic community
23. Ecological succession theories and describe in detail about hydrarch succession
24. Systematic position, spot characters, economic importance and two trees of the family Rhizophoraceae

CORE COURSE 3- PRINCIPLES AND PRACTICES OF SILVICULTURE

Semester	Course Code	Hours per week	Credit	Exam Hours
III	3B03FOR	2+1	3	3

Course outcomes

1. Understand the growth and development of trees in even aged and uneven aged forest
2. Understand the factors of locality
3. Understand the natural regeneration occurred in various silvicultural systems
4. Understand various nursery techniques and planting patterns
5. Determine the spacing and number of plants for a nursery
6. Develop a forest nursery

Module I: Principles of Silviculture (5Hrs)

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 unevenaged forest.

Module II: Factors of Locality (8Hrs)

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 and Biotic factors

Module III: Practices of Silviculture (18Hrs)

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. Artificial regeneration – objectives - essential considerations - organization of plantation work. 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: Nursery Technology (5Hrs)

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.

PRACTICALS

(1 Hr/Week)

1. Determination of area required for nursery
2. Visit a nearby nursery, Familiarise and prepare the nursery management practices undertaken
3. Stump preparation of Teak
4. Patterns of planting

5. Preparation of nursery bed
6. Determination of number of plants required for given spacing
7. Determination of Spacing required for given number of plants

BOOKS FOR REFERENCE

- Khanna, L.S.1989. *Principles and Practice of Silviculture*. KhannaBandhu, Dehra Dun. 473 p
- Smith, D. M et al. 1997. *The Practice of Silviculture: Applied Forest Ecology*. John Willey and Sons. Inc. 537p
- 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

Marks Including Choice

Unit	Marks
Module I	8
Module II	15
Module III	25
Module IV	12

KANNUR UNIVERSITY THIRD SEMESTER BSc DEGREE EXAMINATION

3B03FOR - PRINCIPLES AND PRACTICES OF SILVICULTURE

TIME: 3Hrs

MAXIMUM MARKS: 40

Part A - Short answer Questions **Answer All**

(6 X 1 = 6)

1. Define silviculture
2. Define nursery
3. Define aspect
4. Define Nurse crop
5. Define silvics
6. Beating up

Part B- Short Essay Questions **Answer Any Six**

(6 x 2=12)

7. Germination capacity and germination percentage
8. Seed dispersal
9. Biotic factors
10. Natural regeneration by root suckers
11. Types of nursery based on irrigation
12. Different patterns of planting
13. Objectives of silviculture
14. Media used in nursery

Part C- Essay Questions ***Answer Any Four**

(4 x 3=12)

15. Different types of containers used in nursery
16. Crown differentiation
17. Importance of light in influencing vegetation
18. Frost injuries
19. Classification of nursery
20. Methods of planting and advantages of stump preparation

Part D- Long Essay* Questions **Answer Any Two**

(2 x 5=10)

21. Importance of climatic factors on vegetation
22. Objectives and essential considerations in Artificial regeneration
23. Establishment of nursery
24. Discuss the natural regenerations under various silvicultural systems

CORE COURSE 4- TREE PHYSIOLOGY AND FOREST SEED TECHNOLOGY

Semester	Course Code	Hours per week	Credit	Exam Hours
III	3B04FOR	3+2	3	3

Course Outcomes

1. Understand the structure of various cell organelles
2. Understand the physiological functions of a tree
3. Understand various plant hormones and their role in plant growth
4. Understand the tolerance and avoidance mechanisms of trees against various stresses
5. Understand the development and maturation of seeds
6. Explain the various steps in seed processing
7. Determine the viability, germination and vigour of seeds

Module I: Cell organelles and Physiological functions of a tree (20 Hrs)

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. Transpiration, factors influencing transpiration rate. Stomata, structure, function - Mechanism of stomatal movement, antitranspirants. 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.

Module II: Plant growth and Stress physiology (10 Hrs)

Physiological aspects of micro and macro nutrients and mechanisms of nutrient uptake. Plant growth substances: Auxins, Gibberellins, Cytokinins, Ethylene, ABA and physiological significance. Photoperiodism and plant movements. Stress physiology - abiotic stresses, its effect, avoidance and tolerance mechanisms - drought, high temperature, chilling and salinity.

Module III: Reproductive biology and handling of tropical seeds (10 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 like extraction seed drying

Module IV: Seed Processing (14 Hrs)

Seed processing - principles and objectives, seed cleaning methods. Seed treatment- presowing, prestorage and mid storage seed treatments. Seed pelleting – advantages and methods. Seed storage - classification of seeds based on storage, life span of seeds, 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 certification and Seed Act.

PRACTICALS

(2Hrs/Week)

1. Determination of relative water content
2. Estimation of stomatal density
3. Effect of growth regulators on seed germination and rooting of cuttings
4. Experiment to demonstrate geotropism using Clinostat
5. Estimation of total chlorophyll content

6. Estimation of transpiration and respiration rate
7. Plant growth analysis – RGR, NAR, LAR - Leaf Area Index (LAI)
8. Familiarise the Important tree seeds of college campus
9. Estimation of seeds required for a nursery
10. Purity testing of seeds
11. Estimation of seed viability
12. Estimation of seed germination with various dormancy breaking methods

BOOKS FOR REFERENCE

- 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.
- 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

Marks Including Choice

Unit	Marks
Module I	18
Module II	12
Module III	18
Module IV	12

KANNUR UNIVERSITY THIRD SEMESTER BSc DEGREE EXAMINATION

3B04FOR - TREE PHYSIOLOGY AND FOREST SEED TECHNOLOGY

TIME: 3Hrs

MAXIMUM MARKS: 40

Part A - Short answer Questions **Answer All**

(6 X 1 = 6)

1. Define water potential
2. List out the macro nutrients
3. Define seed vigour
4. Define seed germination
5. Define vernalization
6. Define seed year

Part B- Short Essay Questions **Answer Any Six**

(6 x 2=12)

7. Structure of chloroplast
8. Z scheme
9. Photoperiodism
10. Seed certification
11. Orthodox and recalcitrant seeds
12. Criteria of essentiality
13. Structure of Rubisco
14. Seed orchard

Part C- Essay Questions ***Answer Any Four**

(4 x 3=12)

15. Seed sampling
16. Anti transpirants
17. Krebs cycle
18. Seed pelleting and advantages
19. Plant growth movements
20. C4 pathway

Part D- Long Essay* Questions **Answer Any Two**

(2 x 5=10)

21. Plant growth substance and its physiological significance
22. Dormancy and classification of seed dormancy
23. Mechanisms of water uptake in plants
24. Mechanisms of nutrient uptake in plants

**GENERAL AWARENESS COURSE 1- FUNDAMENTALS OF WILDLIFE SCIENCE AND CONSERVATION
BIOLOGY**

Semester	Course Code	Hours per week	Credit	Exam Hours
III	3A11FOR	3+1	3	3

Course Outcomes

1. Understand the definition and values of wildlife
2. Understand the behaviour of wild animals
3. Basic knowledge on mammalogy, ornithology and herpetology
4. Identify common birds, mammals, reptiles and amphibians
5. Understand fundamentals of conservation biology
6. Familiarize major conservation projects in India and world

Module I: Introduction to Wildlife

(6 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: Behaviour of Wild animals

(12Hrs)

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: Mammalogy, herpetology and ornithology

(20 Hrs)

Mammalogy - 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 – feeding, breeding, nesting and reproductive behaviour. Bird migration – reasons, patterns and mechanics of migration.

Module IV: Conservation Biology

(16Hrs)

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.

PRACTICALS

(1Hr/Week)

1. Study of characteristics of wildlife in different biogeographic zones of India
2. Field identification of larger mammals of the orders Primates, Carnivora, Proboscidea, Perissodactyla, Artiodactyla, Pholidota, and Lagomorpha
3. Study on field identification of various families under order chiroptera
4. Study on field identification small mammals of rodentia, erinaecomorpha and soricomorpha

5. Study on identification features and representatives of Western Ghats birds of Orders - Podicipediformes, Procellariiformes, Pelicaniformes, Ciconiiformes, Phoenicopteriformes, Anseriformes, Falconiformes, Galliformes, Gruiformes, Caradriformes, Columbiformes, Psittaciformes, Cuculiformes, Strigiformes, Caprimulgiformes, Apodiformes, Trogoniformes, Coraciformes, Upupiformes, Piciformes and Passeriformes.
6. Study on Protected Areas of Kerala and India
7. Visit to zoo and protected areas to familiarize with wild animals – observations on morphological features, behaviour, feeding, breeding etc.

BOOKS FOR REFERENCE

- Dasmann, R.F. 1982. Wildlife Biology. Wiley Pub. New York.
- ReenaMathur. 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.
- VivekMenon. 2003. Field Guide to Indian Mammals. Penguin Books, India.
- 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.
- Hunter L Malcom. 1996. Conservation Biology. Blackwell Science. Chicago
- Kumar and Asija. Biodiversity – Principles and conservation. UpdeshPurohit, Agrobios, Jodhpur
- Negi, S.S. 1993. Biodiversity and its Conservation in India. India Publishing company, New Delhi

- **Marks Including Choice**

Unit	Marks
Module I	8
Module II	12
Module III	20
Module IV	20

3A11FOR - FUNDAMENTALS OF WILDLIFE SCIENCE AND CONSERVATION BIOLOGY

TIME: 3Hrs

MAXIMUM MARKS: 40

Part A - Short answer Questions **Answer All**

(6 X 1 = 6)

1. Define wildlife
2. Two mammals endemic to Western Ghats
3. Structural colouration
4. Diastema
5. Define herpetology
6. Define conservation biology

Part B- Short Essay Questions **Answer Any Six**

(6 x 2=12)

7. Clutch size
8. Types of feathers in birds
9. Principles of conservation biology
10. Name four reptiles endemic to Western Ghats
11. Camouflage behavior in wild animals
12. Significance of territory
13. Types of bird migration
14. Difference between community reserves and conservation reserves

Part C- Essay Questions ***Answer Any Four**

(4 x 3=12)

15. Theory of island biogeography
16. Ethics in conservation
17. Methods of conservation with examples
18. Characteristic features and representatives of Artiodactyla
19. Adaptations of wild animals
20. Characteristic features and representatives of Primates

Part D- Long Essay* Questions **Answer Any Two**

(2 x 5=10)

21. Learned behavior of wild animals
22. IUCN redlist categories and criteria
23. Values of wildlife
24. Major conservation projects in India

GENERAL AWARENESS COURSE 2- ANATOMY, STRUCTURE AND PROPERTIES OF WOOD

Semester	Course Code	Hours per week	Credit	Exam Hours
III	3A12FOR	2+1	3	3

Course outcomes:

1. Understand the process of wood formation, cellular and chemical constituents of wood.
2. Understand the physical, mechanical, thermal, electric and acoustic properties of wood
3. Identify common timbers of commerce.
4. Understand abnormalities of wood and the impact of such deviations in wood properties.

Module I: WOOD FORMATION

(8Hrs)

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. Bark formation, Types and function.

Module II: STRUCTURE OF WOOD

(10 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. Three dimensional features of wood; transverse, tangential and radial surfaces. Elements and structure of wood cell wall. Juvenile wood and mature wood.

Module III: ABNORMALITIES IN WOOD

(8Hrs)

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, knots - live and dead knots.

Module IV: PROPERTIES OF WOOD

(10Hrs)

Physical properties of wood - colour, hardness, weight, texture, grain, figure and lustre. 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. Timber identification - general principles.

PRACTICALS

(1Hr/Week)

1. Identification of 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. Field identification of common timber species of Kerala
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.

8. Visit to wood testing laboratories.

BOOKS FOR REFERENCE

- 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.

Marks Including Choice

Unit	Marks
Module I	8
Module II	15
Module III	12
Module IV	25

KANNUR UNIVERSITY THIRD SEMESTER BSc DEGREE EXAMINATION

3A12FOR: Anatomy, Structure and Properties of Wood

TIME: 3Hrs

MAXIMUM MARKS: 40

Part A - Short answer Questions **Answer All**

(6 X 1 = 6)

1. Sapwood
2. Grain
3. Annual ring
4. Wood specific gravity
5. Lustrous wood
6. Rays

Part B- Short Essay Questions **Answer Any Six**

(6 x 2=12)

7. Distinguish between ray initials and fusiform initials
8. Anticlinal and periclinal division
9. Simple pit and bordered pit
10. Juvenile wood and mature wood
11. Live knot and dead knot
12. Reaction wood
13. Different types of bark
14. Xylem elements

Part C- Essay Questions ***Answer Any Four**

(4 x 3=12)

15. Planes of surfaces of wood
16. Describe cellwall formation in plants
17. Electrical properties of wood
18. Extractives seen in wood
19. Thermal conductivity of wood
20. Chemical composition of wood

Part D- Long Essay* Questions **Answer Any Two**

(2 x 5=10)

21. Explain the process of wood formation in dicots
22. Describe various cellular elements in wood along with their function
23. Explain briefly about various abnormalities seen in wood
24. What are different mechanical properties of wood?

GENERAL AWARENESS COURSE 3- AGROFORESTRY, SOCIAL FORESTRY AND HUMAN DIMENSIONS

Semester	Course Code	Hours per week	Credit	Exam Hours
IV	4A13FOR	3+2	3	3

Course outcomes

1. Understand management of tree species along with agriculture crops
2. Design suitable agroforestry practice based on demand and site conditions
3. Understand the practice of forestry with the involvement of local people for their own betterment
4. Understand tribes in India and Kerala and their lifestyle

Module I: AGROFORESTRY

(12Hrs)

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: MANAGEMENT OF AGROFORESTRY SYSTEMS

(12Hrs)

Tree crop interaction – Positive interactions- complementarity - compatibility - mutualism, commensalism - Negative interactions – allelopathy and competition. Interaction management - Aboveground and belowground interactions- Manipulation of density, space, crown and roots. Tree Management – structure and growth of trees, crown and root architecture, agroforestry practices to minimize negative interaction – coppicing, thinning, pollarding and pruning – crop planning and management –selection of suitable crops –management of nutrients, water and weeds – Multipurpose trees species, desirable characters of trees in agroforestry. Management of trees in agroforestry- Tree architecture, canopy management - lopping, pruning, pollarding and hedging. Advantages and disadvantages of agroforestry systems. National Agroforestry Policy 2014— National and International organizations in Agroforestry.

Module III: SOCIAL FORESTRY

(10Hrs)

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 IV: Forestry Extension

(8Hrs)

Forestry Extension Education – concept, scope and principles. People's participation in forestry extension programmes – community forestry and participatory forestry. Participatory Rural Appraisal – techniques. Joint forest management – concept, benefits and impact. Village Forest Council – formation and functions.

Module V: HUMAN DIMENSIONS IN FORESTRY

(12Hrs)

Ethnobiology - definition, Ethno botany and Ethno zoology. Primitive tribes in India and Kerala. 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. Ecocodevelopment through tribal development - Case study of Periyar Tiger Reserve.

PRACTICALS

(2Hr/Week)

1. Traditional agroforestry systems in the country and visits to some of the local agroforestry systems
2. Agroforestry systems in different agroecological zones- their structural and functional features
3. Visit to on farm agroforestry models
4. Studies on fodder banks and live fences.
5. MPTs and Nitrogen fixing trees in agroforestry
6. Design & Diagnostics exercise in agroforestry- Land capability classification of various topographic regions
7. Visit to industrial plantations.
8. Survey of agroforestry practices in local/adjoining areas
9. Exercises on PRA techniques

BOOKS FOR REFERENCE

- 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.
- SenSarma, P.K. and Jha, L.K. 1993. Agroforestry. Indian Perspectives. Ashish Publishers, Delhi
- Patra A. 2013. Agroforestry: Principles and Practices, New India Publishing Agency, 260 p
- Raj A. J. and S. B. Lal (eds.) 2013. Agroforestry-Theory and Practice. Scientific Publishers (India), Jodhpur
- Huxley P. A. 1999. Tropical Agroforestry. Wiley: 384p.
- Pathak P.S. and Ram Newaj (eds.) 2003. Agroforestry: Potentials and Opportunities. Agrobios, Jodhpur.
- 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
- Hasnain N. 2007. Tribal India. New Royal Book Company
- Hasnain N. 2011. Indian Anthropology. PalakaPrakashan
- Furer-Haimendorf C.V. Tribes of India - the struggle for survival. OUP. New Delhi
- Sharma R.N. and Bakshi S. 1984. Tribes and tribal development. Uppal Publ. House, New Delhi

• **Marks Including Choice**

Unit	Marks
Module I	16
Module II	16
Module III	10
Module IV	8
Module V	10

KANNUR UNIVERSITY FOURTH SEMESTER BSc DEGREE EXAMINATION

4A13FOR - Agroforestry, Social Forestry and Human Dimensions

TIME: 3Hrs

MAXIMUM MARKS: 40

Part A - Short answer Questions **Answer All**

(6 X 1 = 6)

1. Farm forestry
2. MPTs
3. Protein bank
4. NWFP
5. PRA
6. Examples for two nitrogen fixing trees

Part B- Short Essay Questions **Answer Any Six**

(6 x 2=12)

7. Windbreak and shelter belts
8. Silvopastoral systems
9. Constraints of Indian agriculture
10. Alley cropping
11. Lopping and pruning
12. Village forests
13. Allelopathy
14. Afforestation in waterlogged areas

Part C- Essay Questions ***Answer Any Four**

(4 x 3=12)

15. Shifting cultivation
16. Classification of wastelands
17. Desirable characters of trees in agroforestry
18. Organizations involved in social forestry
19. Classification of taungya
20. Problems faced by tribes in India

Part D- Long Essay* Questions **Answer Any Two**

(2 x 5=10)

21. Classification of agroforestry systems
22. Management of trees in agroforestry
23. Major tribes in India
24. Advantages and disadvantages of agroforestry

Semester	Course Code	Hours per week	Credit	Exam Hours
IV	4A14FOR	3+2	3	3

Course Outcomes

1. Understand various physical and chemical properties of soil
2. Understand the formation of soils
3. Understand the general features of various soils in India and Kerala
4. Determine the problems of soil
5. Analyze the statistical data and make an interpretation
6. Understand the principles of watershed management

Module I: PROPERTIES OF SOIL

(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.

Module II: SOIL FERTILITY

(18 Hrs)

Soil fertility and productivity 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. Soil fertility evaluation

Module III: SOIL TYPES AND SOIL SURVEY

(8 Hrs)

Forest soil- features and importance. Soils of India and Kerala. Wastelands - definition, extent and classification. Afforestation on different ecological systems. Reclamation and suitable tree species for acid, saline, sodic, lateritic, calcareous, sandy, shallow, water logged and mine spoiled soils. Soil survey - objectives and types of soil survey.

Module IV: HYDROLOGY AND WATERSHED MANAGEMENT

(16 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. Water harvesting - traditional and modern methods

PRACTICALS

(2Hrs/Week)

1. Examination of soil profile
2. Collection and preparation of soil samples
3. Determination of soil pH
4. Determination of electrical conductivity
5. Determination of soil moisture

6. Estimation of Organic carbon by Walkley and Black method
7. Determination of available nitrogen
8. Determination of available phosphorous
9. Determination of available potassium
10. Visit nearby farms and nurseries to understand the different water harvesting measures

BOOKS FOR REFERENCE

- 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.

Marks Including Choice

Unit	Marks
Module I	12
Module II	18
Module III	12
Module IV	18

KANNUR UNIVERSITY FOURTH SEMESTER BSc DEGREE EXAMINATION

4A14FOR - SOIL CV-SCIENCE, HYDROLOGY AND WATERSHED MANAGEMENT

TIME: 3Hrs

MAXIMUM MARKS: 40

Part A - Short answer Questions **Answer All**

(6 X 1 = 6)

1. Define pedology
2. Define watershed
3. Define laterisation
4. Define soil structure
5. Define soil pH
6. List out two traditional methods of water harvesting

Part B- Short Essay Questions **Answer Any Six**

(6 x 2=12)

7. Compare soil fertility and soil productivity
8. Compare bulk density and particle density
9. Differentiate Eluviation and Illuviation
10. Soil fertility evaluation
11. Rainfall characteristics
12. Objectives of watershed management
13. Hydrological cycle
14. Cation Exchange Theory

Part C- Essay Questions ***Answer Any Four**

(4 x 3=12)

15. Soil profile and characteristics of various horizons
16. Nitrogen Cycle
17. Role of microorganisms in the decomposition of organic matter
18. Types of soil survey
19. Forest soil and its features
20. Reclamation measures of saline soil

Part D- Long Essay* Questions **Answer Any Two**

(2 x 5=10)

21. Physical properties of soil and their role in soil fertility
22. Soils of India
23. Modern methods in water harvesting
24. Functions, forms and availability of various nutrients in soil

CORE COURSE 5- SILVICULTURAL SYSTEMS, SILVICULTURE OF INDIAN TREES AND PLANTATION FORESTRY

Semester	Course Code	Hours per week	Credit	Exam Hours
IV	4B05FOR	3+2	3	3

Course outcomes

1. Understand major silvicultural systems
2. Explain the silvicultural characters and phenology of trees
3. Understand the regeneration methods of trees
4. Establish a plantation of tree crop
5. Understand the maintenance of plantations
6. Create a record and journal for a plantation

Module I: Silvicultural systems

(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 shelter wood strip system; the wedge system; the strip and group systems, 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.

Module II: Silviculture of Indian trees

(10 Hrs)

General description, phenology, silvicultural characters, regeneration methods, silvicultural systems, and economic importance of the following tree species: *Tectonagrandis*, *Shorearobusta*, *Dalbergiasissoo*, *Santalum album*, *Swieteniamacrophylla*, *Pterocarpussantalinus*, *Eucalyptus* spp, *Casuarinaequisetifolia*, *Cedrusdeodara*, *Pinusroxburghii*

Module III: Plantation Forestry

(20 Hrs)

Plantation Forestry – Definition and scope. Plantation forests plantation records and maps. Choice of species - concept of fast growth - exotics vs. indigenous. 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.

PRACTICALS

(2Hrs/Week)

1. Prepare a phenogram of campus trees
2. Morphological description and identification of species, seeds, seedlings, planting and stand management practices of *Tectonagrandis*
3. Morphological description and identification of species, seeds, seedlings, planting and stand management practices of *Santalum album*
4. Morphological description and identification of species, seeds, seedlings, planting and stand management practices of *Swieteniamacrophylla*
5. Morphological description and identification of species, seeds, seedlings, planting and stand management practices of *Pterocarpussantalinus*
6. Morphological description and identification of species, seeds, seedlings, planting and stand management practices of *Eucalyptus* sp.

7. Morphological description and identification of species, seeds, seedlings, planting and stand management practices of *Casuarinaequisetifolia*
8. Visit to various plantations and forest areas to familiarise with species and study their silvicultural characters.
9. Exercise on staking and alignment in plantation establishment

BOOKS FOR REFERENCE

- Ramprakash and Khanna, L.S. 1991. *Theory and Practice of Silvicultural systems*. Internationalbook Distributors. 298p
- 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
- 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

Marks Including Choice

Unit	Marks
Module I	20
Module II	12
Module III	28

KANNUR UNIVERSITY FOURTH SEMESTER BSc DEGREE EXAMINATION

4B05FOR - SILVICULTURAL SYSTEMS, SILVICULTURE OF INDIAN TREES AND PLANTATION FORESTRY

TIME: 3Hrs

MAXIMUM MARKS: 40

Part A - Short answer Questions *Answer All*

(6 X 1 = 6)

1. Define silvicultural systems
2. List out the major coppice systems
3. Define phenology
4. Define plantation journal
5. Define periodic block
6. Regeneration interval

Part B- Short Essay Questions *Answer Any Six*

(6 x 2=12)

7. Compare pollarding and girdling
8. Characteristics of a plantation
9. Advantages of a clonal plantation
10. Improvement felling
11. Energy plantations
12. Coppice of two rotation
13. Pruning and types of pruning
14. Scope of plantation forestry

Part C- Essay Questions **Answer Any Four*

(4 x 3=12)

15. Compare tending and cultural operations
16. Silvicultural characters of Teak
17. Group system
18. Pruning and types of pruning
19. Selection systems
20. Constraints in plantation forestry

Part D- Long Essay* Questions *Answer Any Two*

(2 x 5=10)

21. Clear felling systems , its advantages and disadvantages
22. Kinds of Thinning in regular forests
23. Silviculture of *Dalbergiasissoo*
24. Detailed note on strip plantations

CORE COURSE 6- CORE PRACTICAL I

Semester	Course Code	Hours per week	Credit	Exam Hours
IV	4B06FOR	-	4	3

Practicals of the core courses offered during I, II, III, and IV semesters.

- Forests, Forestry and Biodiversity
- Forest Ecology and Dendrology
- Principles and Practices of Silviculture
- Tree physiology and Forest Seed Technology
- Silviculture Systems, Silviculture of Indian trees and Plantation Forestry

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

MODEL QUESTION PAPER

4B06FOR - CORE PRACTICAL – I

Time: 3 Hrs

Max. Marks: 40

1. Find out the IVI of all the species from the given data. Draw a polygraph of the species having maximum IVI. (8 marks)
 2. Take a VS of the flower A. Construct the floral diagram and floral formula (6 marks)
 3. Identification and spot characters of the given specimen B? (3marks)
 4. Write the procedure of the experiment C (3 marks)
 5. Workout and solve the problem D (3 marks)
 6. Write a short note on E (3 marks)
 7. Workout and solve problem F (3 marks)
 8. Write a short note on given Forest type G (2 marks)
 9. Identification of H, I, J, K (2 marks)
 10. Spot at sight L, M, N, O (2 marks)
- Viva-voce (5 marks)

Key to the specimens

- A – Flower of any family given in the syllabus
 B –Campus tree
 C – Tree physiology experiment
 D- Estimation of seed requirement for a nursery/purity testing/germination percentage
 E – Herbarium preparation/Profile diagram/Stump preparation
 G – Evergreen/Moist deciduous/Dry deciduous/Mangrove/Shola/Myristica swamps
 H, I, J, K, – Campus tree seeds
 L, M, N, O – Instruments and equipments

GENERAL AWARENESS COURSE 5 - GENERAL PRACTICAL

Semester	Course Code	Hours per week	Credit	Exam Hours
IV	4A15FOR	-	4	3

Practicals of the general courses offered during III, and IV semesters.

- Fundamentals of Wildlife Science and Conservation Biology
- Anatomy, Structure and Properties of Wood
- Agroforestry, Social Forestry and Human Dimensions
- Soil Science, Hydrology and Watershed Management

Collections and submissions: Each student shall submit not less than 20 wood specimens.

MODEL QUESTION PAPER

4A15FOR - GENERAL AWARENESS PRACTICAL

Time: 3 Hrs

Max. Marks: 32

-
1. Estimate the organic carbon in the given sample (8 marks)
 2. Find out the specific gravity of the given wooden specimen (3 marks)
 3. Identify the specimen A & B and write the procedure (2 x 2 = 4 marks)
 4. Workout and solve problem C (3 marks)
 5. Spot D, E, F and G on the given Map (2 marks)
 6. Write the common name and the orders of H, I, J, K (2 marks)
 7. Name two species each suitable for L and M (2 marks)
 8. Write a short note on N (2 marks)
 9. Identify the plane of surface P and write down the features (2 marks)
- Viva-voce (4 marks)

Key to the specimens

A & B – Small clear wood specimens

C – MoR/MoC/Moisture content in wood

D, E, F, G – Protected areas of India

H, I, J, K, – Common birds of Kerala

L, M – Live fence, protein bank, Fodder trees, Wind break

N- Preparation of small clear specimens/collection and preparation of soil sample/Determination of Electrical conductivity /Determination of soil pH

P- Plane of surface – Transverse section/Longitudinal section/Radial section

CORE COURSE 7- FOREST RESOURCE UTILIZATION AND WOOD BASED INDUSTRIES

Semester	Course Code	Hours per week	Credit	Exam Hours
V	5B07FOR	4+2	3	3

Course outcomes

1. Understand Timber and Non- Timber Forest Produce, their extraction, Processing and utilization
2. Understand forest based industries and their current status in India and all over the world
3. Identify and collect Non timber forest produce
4. Evaluate the demand and supply of wood based industries

Module I: Logging

(8Hrs)

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.

Module II: Manufacturing of Wood Products

(12Hrs)

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. manufacture of rayon and other cellulose derived products. Destructive distillation of wood. Saccharification of wood.

Module III: Wood Based Industries

(14Hrs)

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.

Module IV: Utilization of Non-Timber Forest Products

(30 Hrs)

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. 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.

Module V: Medicinal and aromatic plants**(8Hrs)**

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*, *Saracaasoca*, *Phyllanthusemblica*, *Gmelinaarborea*, *Wrigtiatinctorea*, *Holarrhenapubescens* and *Terminalia spp.*

PRACTICALS**(2Hrs/Week)**

1. Visits to the following wood based industries to learn the manufacturing procedures adopted and raw materials used: Plywood factory, Paper mill, Match industry, Saw mill and Furniture factory
2. Manufacture of Plywood, Particle board and Fibre board
3. Carrying out of mycological test of plywood
4. Manufacture of paper
5. Harvesting and oil extraction of aromatic plants
6. Important non-timber forest products in Kerala
7. Important medicinal and aromatic plants in Kerala
8. Manufacture of shellac
9. Manufacture of Kuch and Katha
10. Resin Tapping and Manufacture of Turpentine

BOOKS FOR REFERENCE

- Mehta, T. 1981. *A Handbook of Forest Utilization*. International Book Distributors. 208 p.
- 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. Indian Forest Utilization. Vol I and II. Forest Research Institute Dehra Dun
- Rydholm 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.
- 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 PalSingh, 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

MODEL QUESTION PAPER

Unit	Marks
Module I	8
Module II	12
Module III	12
Module IV	20
Module V	8

KANNUR UNIVERSITY FIFTH SEMESTER BSc DEGREE EXAMINATION

5B07FOR- Forest Resource Utilization and Wood Based Industries

TIME: 3Hrs

MAXIMUM MARKS: 40

Part A - Short answer Questions **Answer All**

(6 X 1 = 6)

1. RIL
2. Examples of two tree species used in matchbox industry
3. Root dye
4. Vendura
5. Floss
6. Myrobalans

Part B- Short Essay Questions **Answer Any Six**

(6 x 2=12)

7. Precision silviculture
8. Cutch and Katha
9. Sizing of paper
10. Compreg
11. PF resin
12. Two examples for tannin yielding plants
13. Veneering
14. Saccharification of wood

Part C- Essay Questions ***Answer Any Four**

(4 x 3=12)

15. Felling Rules
16. Processing of beedi leaves
17. Improved wood
18. Timber depots and its types
19. Constraints in wood based industries
20. Manufacture of rayon

Part D- Long Essay* Questions **Answer Any Two**

(2 x 5=10)

21. Adhesives used in composite wood
22. Miscellaneous products from forest
23. Mechanized harvesting systems
24. Manufacture of hardboard

CORE COURSE 8- FOREST SURVEY AND GEOINFORMATICS

Semester	Course Code	Hours per week	Credit	Exam Hours
V	5B08FOR	3+2	3	3

Course outcomes

1. Understand the theory and practice of various types of surveys and their applications in forestry
2. Survey an area - taking offsets, preparation of outline maps and calculation of area
3. Understand the basics of remote sensing, satellite systems and aerial photography
4. Acquaintance with GPS, its working principle and applications in forestry
5. Preparation of thematic overlays and maps using GIS tools.

Module I: Forest Surveying and Levelling (25 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.

Module II: Remote Sensing (15 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.

Module III: Global Positioning System (GPS) (4 Hrs)

GPS – working principle. Space segment, control segment and user segment. Applications of GPS in Forestry and Wildlife.

Module IV: Geographical Information System (GIS) (10Hrs)

Components of GIS. Spatial and non-spatial data. Raster and Vector data. Integration of attribute data with spatial data. Georeferencing. Thematic overlays in GIS. Application of GIS in forestry.

PRACTICALS

(2 Hrs/Week)

1. Instruments used in Chain Survey
2. Chain survey of an area
3. Chain survey across obstacles
4. Compass traversing
5. Plane table surveying of an area
6. Levelling of an area
7. Forest map reading
8. Study of scales of photographs
9. Preparation of base map using survey of India map
10. Visual interpretation of satellite imagery
11. Acquaintance with softwares used in GIS
12. Digitization of maps - georeferencing
13. Preparation of species distribution map using GPS and open source GIS tools
14. Vegetation mapping - preparation of NDVI map

BOOKS FOR REFERENCE

- Punnia, 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

Marks Including Choice

Unit	Marks
Module I	30
Module II	15
Module III	5
Module IV	10

5B08FOR- FOREST SURVEY, AND GEOINFORMATICS

TIME: 3Hrs

MAXIMUM MARKS: 40

Part A - Short answer Questions **Answer All**

(6 X 1 = 6)

1. Define Forest surveying
2. Define remote sensing
3. Contour
4. Offsetting
5. Attribute data
6. Levelling

Part B- Short Essay Questions **Answer Any Six**

(6 x 2=12)

7. Reduced level
8. Advantages of plain table surveying
9. Types of remote sensing
10. Uses of theodolite
11. Georeferencing
12. Principles of remote sensing
13. Components of GIS
14. Survey stations in chain survey

Part C- Essay Questions ***Answer Any Four**

(4 x 3=12)

15. Ranging of survey lines
16. Importance of maps in forestry
17. Satellite systems
18. Working principle of GPS
19. Digital image processing
20. Differentiate Raster and Vector data.

Part D- Long Essay* Questions **Answer Any Two**

(2 x 5=10)

21. Types of surveying
22. Applications of remote sensing and GIS in forestry
23. Classification, platforms and sensors in aerial photography
24. Chaining across obstacles

CORE COURSE 9- FOREST MENSURATION AND FOREST MANAGEMENT

Semester	Course Code	Hours per week	Credit	Exam Hours
V	5B09FOR	4+2	3	3

Course outcomes

1. Understand and carry out various measurements of individual trees, stands or whole forest
2. Working knowledge on various instruments for measurement of tree girth, diameter and height
3. Determine volume of logs, standing trees or whole forest
4. Calculate or predict the yield from a plantation
5. Understand the art and science of forest management
6. Knowledge on formulation and drawing of working plan

Module I: Diameter and Girth measurement of trees

(8 Hrs)

Forest Mensuration - definition, objectives and scope. Units of measurement. 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.

Module II: Tree height measurement

(16 Hrs)

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 – 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 III: Tree volume measurement

(20 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. 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.

Module IV: Forest Management

(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. Growing stock. Yield regulation – definition and objectives. Yield regulation based on area, volume, area and volume. Increment Percent.

Module V: Working Plan

(8 Hrs)

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.

PRACTICALS

(2Hrs/Week)

1. Standard rules governing breast height measurement

2. Instruments used in diameter and girth measurement
3. Measurement of bark thickness
4. Conversion of GOB into GUB and DOB into DUB
5. Non-instrumental methods of tree height measurements
6. Instrumental methods of tree height measurements – tangent method and sine method
7. Measurement of tree height using Christen’s Hypsometer
8. Measurement of tree height using Smythies Hypsometer
9. Measurement of tree height using Modified Smythies Hypsometer
10. Measurement of tree height using Brandis Hypsometer
11. Measurement of tree height using Haga Altimeter
12. Measurement of tree height using Ravi Altimeter
13. Calculation of volume of a log
14. Determination of age of a tree using Increment Borer
15. Determination of age of a tree by three periodic measurements
16. Preparation of stock map
17. Standard format of working plan

BOOKS FOR REFERENCE

- 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, UKRamprakash. 2001. *Forest management*. International Book Distributors. Dehradun 256p
- Negi, S.S. 1984. *Scientific management of forest*. Bishen Singh Mahendra Pal Singh, Dehradun. 123 p.

Marks Including Choice

Unit	Marks
Module I	10
Module II	10
Module III	15
Module IV	20
Module V	5

KANNUR UNIVERSITY FIFTH SEMESTER BSc DEGREE EXAMINATION

5B09FOR- FOREST MENSURATION AND FOREST MANAGEMENT

TIME: 3Hrs

MAXIMUM MARKS: 40

Part A - Short answer Questions **Answer All**

(6 X 1 = 6)

1. Define Forest mensuration
2. Define normal forest
3. Sustained yield
4. Name two instruments used for tree height measurement
5. Commercial bole height
6. Stock map

Part B- Short Essay Questions **Answer Any Six**

(6 x 2=12)

7. Advantages and disadvantages of tape in diameter and girth measurement
8. Metzger's theory of tree form
9. Quarter girth formula
10. Determination of age of trees by three periodic measurements
11. Organization of forest property
12. Causes of abnormality in forests
13. Length and choice of rotation
14. Standard format of a working plan

Part C- Essay Questions ***Answer Any Four**

(4 x 3=12)

15. Non instrumental methods of tree height measurement
16. Volume measurement of branch wood and root wood
17. What is meant by volume table? How the volume tables are classified?
18. Relationship between CAI and MAI
19. Forest management is an art and science. Justify?
20. Unique features of forest management when compared to industrial and agricultural management.

Part D- Long Essay* Questions **Answer Any Two**

(2 x 5=10)

21. What is meant by breast height measurement? What are the advantages? Explain with supporting diagrams the standard rules governing breast height measurement.
22. 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
23. Yield regulation based on volume
24. Explain in detail about the formulation and drawing of a working plan

Semester	Course Code	Hours per week	Credit	Exam Hours
V	5B10FOR	4+2	3	3

Course outcomes

1. Understand genetic, environmental and phenotypic expression of trees
2. Understand the importance of tree improvement
3. Familiarize tree breeding methods – selection, hybridization and introduction
4. Carrying out various plant tissue culture techniques
5. Understand genetic engineering and its application in forestry

Module I: Forest Genetics

(10 hours)

Reproduction in forest trees – anthesis and pollination – their importance in tree breeding. Quantitative inheritance, heritability, genetic advance, genetic gain, combining ability and their application. Genetic, environmental and phenotypic expression of trees.

Module II: Tree Improvement

(30 hours)

Introduction, history and development of tree improvement. Genetic basis of tree breeding Natural variability in trees – types. Forces that change variability. Various tree breeding methods and importance– selection, hybridization and introduction. Exotic forestry. Provenance testing - seed production areas – seed orchards. Progeny trial and improvement of seed orchards. Back cross breeding, heterosis breeding. Clonal forestry. breeding for resistance to insect pest, diseases, air pollution and for wood properties. Conservation of forest tree germplasm. Applications of tree breeding in forestry. Vegetative propagation and tree improvement.

Module III: Plant Tissue culture

(25 hours)

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 IV: Genetic engineering

(7 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.

PRACTICALS

(2Hrs/Week)

1. Floral biology and phenological observations in some important species
2. Estimation of pollen sterility
3. Pollen viability analysis.
4. Estimation of heritability, GCA and SCA.
5. Important instruments used in tissue culture lab
6. Preparation of plant tissue culture medium
7. Surface sterilization
8. Production of synthetic seeds
9. Invitro production of haploid plants through anther culture
10. Demonstration of plasmolysis and isolation of protoplast
11. Demonstration of gene transfer technique
12. Demonstration of Confirmation of Genetic transformation.
13. Demonstration of gel-electrophoresis technique
14. Qualitative tests for carbohydrates (starch, lactose/maltose, sucrose, glucose and fructose)

15. Qualitative test for proteins (Biuret test, Millon's test and nitric acid test)

16. Qualitative test for lipids

References

- 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.

Marks Including Choice

Unit	Marks
Module I	10
Module II	20
Module III	20
Module IV	10

KANNUR UNIVERSITY FIFTH SEMESTER BSc DEGREE EXAMINATION

5B10FOR - Forest Genetics, Tree Improvement and Biotechnology

TIME: 3Hrs

MAXIMUM MARKS: 40

Part A - Short answer Questions **Answer All**

(6 X 1 = 6)

1. Synthetic seeds
2. Exotics
3. Provenance
4. SPA
5. Clone
6. Inheritance

Part B- Short Essay Questions **Answer Any Six**

(6 x 2=12)

7. Heterosis
8. Tree improvement
9. Somatic embryogenesis
10. Self incompatibility
11. Explants collection
12. Protoplast culture
13. Selection differential
14. Inoculation

Part C- Essay Questions ***Answer Any Four**

(4 x 3=12)

15. Germplasm preservation
16. Virus free plants
17. Variability in trees
18. Pollination and its types
19. Combining ability and its types
20. Problems of invitro propagation

Part D- Long Essay* Questions **Answer Any Two**

(2 x 5=10)

21. r-DNA technology
22. Culture media and its types
23. Application of biotechnology in forestry
24. Methods in tree breeding

CORE COURSE 11- ECOTOURISM, URBAN FORESTRY AND LANDSCAPE MANAGEMENT

Semester	Course Code	Hours per week	Credit	Exam Hours
VI	6B11FOR	3+1	3	3

Course outcomes

1. Understand the different forms and categories of tourism
2. Understand the objectives and principles of ecotourism
3. Evaluate the ecotourism in protected areas
4. Determine the value and carrying capacity of a tourism destination
5. Understand the importance of urban forestry and landscaping
6. List out the components of landscaping
7. Create a garden design

Module I: ECOTOURISM

(14Hrs)

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.

Module II: ECOTOURISM AND SUSTAINABLE DEVELOPMENT

(20 Hrs)

Ecotourism and sustainable development – guidelines for sustainable ecotourism 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.

Module III: URBAN FORESTRY AND ARBORICULTURE

(8Hrs)

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.

Module IV: LANDSCAPE MANAGEMENT

(12Hrs)

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, parking area and other structures.

PRACTICALS

1. List out the major ecotourism destinations in Kerala
2. Visit an ecotourism site and carry out stakeholder analysis and social impact assessment
3. Estimation of carrying capacity (PCC, RCC and ECC) for a tourism destination
4. Prepare an ecotourism plan for a nearby destination
5. Visit to a commercial landscaped areas and list out the landscaping components
6. List out the various landscaping components in your college campus
7. List out the tools and implements used in landscaping
8. Prepare a list of trees selected for landscaping based on objectives and localities
9. Prepare a garden design for the given area

BOOKS FOR REFERENCE

- 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*. JnanadaPrakashan.
- Chiranjeev, A. 2008. *Ecological, Social and Cultural aspects of Ecotourism*. JnanadaPrakashan.
- Chiranjeev, A. 2008. *Concept of tourism*. JnanadaPrakashan.
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- 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.

Marks Including Choice

Unit	Marks
Module I	20
Module II	20
Module III	10
Module IV	10

KANNUR UNIVERSITY SIXTH SEMESTER BSc DEGREE EXAMINATION

6B11FOR - ECOTOURISM, URBAN FORESTRY AND LANDSCAPE MANAGEMENT

TIME: 3Hrs

MAXIMUM MARKS: 40

Part A - Short answer Questions ***Answer All***

(6 X 1 = 6)

1. Define Ecotourism
2. Green Consumerism
3. Urban Forestry
4. Landscaping
5. Arboriculture
6. Carrying capacity

Part B- Short Essay Questions ***Answer Any Six***

(6 x 2=12)

7. Elements of ecotourism
8. Objectives of ecotourism
9. Forms of ecotourism
10. Topiary
11. Elements of landscaping
12. Characteristics of lawn grass
13. World Ecotourism Summit
14. Edges and Hedges

Part C- Essay Questions ****Answer Any Four***

(4 x 3=12)

15. Stakeholders in Ecotourism
16. Principles of Landscaping
17. Potential of ecotourism in Kerala
18. Arboriculture and its importance in Urban forestry
19. Travel cost method
20. Types of carrying capacity

Part D- Long Essay* Questions ***Answer Any Two***

(2 x 5=10)

21. Environmental and Social impacts of Ecotourism
22. Avenue planting and various planting schemes
23. Components of landscaping
24. Ecotourism in various protected areas of India

CORE COURSE 12- FOREST ECONOMICS AND FOREST STATISTICS

Semester	Course Code	Hours per week	Credit	Exam Hours
VI	6B12FOR	4+2	3	3

Course Outcomes

1. Understand the importance and role of economics and statistics in forestry
2. Analyze the demand-supply and production aspects of forest products
3. Evaluate the profitability or viability of a forestry project
4. Determine the value of forest good and services
5. Analyze the statistical data and make an interpretation
6. Determine appropriate sampling method for collecting data
7. Develop an experimental design for forestry project

Module I: FOREST ECONOMICS

20 hrs

Forest economics- definition, scope and basic concepts. 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). Valuation of forest goods and services- market based and non-market based, use values, non-use values and valuation methods like CVM and TCM.

Module II: PRODUCTION ECONOMICS

14hrs

Production economics- basic concepts like product, resources, production etc. Factors of production. Physical efficiency measures like TPP, APP and MPP. Cost concepts- Fixed, variable, MC, AC, TC. Factor-factor relationships, product-product relationships, Project- project cycle- identification, formulation, appraisal, implementation, monitoring and evaluation. Cost-Benefit analysis and its application in forestry

Module III: FOREST STATISTICS

20hrs

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. 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. Correlation- types of correlation, scatter diagram, coefficient of correlation. Regression- definition, regression coefficients, simple linear regression equations.

Module IV: HYPOTHESIS TESTING AND EXPERIMENTAL DESIGNS

18hrs

Theoretical distributions- binomial, poisson, normal. Test of hypothesis. Z test, t-test, Chi-square test, F test. Experimental designs- important terms and definitions, principles of experimental designs-randomization, replication and local control. Analysis of Variance (ANOVA), assumptions, one way and two way ANOVA, Layout, analysis, advantages and limitations of experimental designs like CRD, RBD, LSD and Factorial experiments. Transformation of data- square root, Angular and Logarithmic transformations.

PRACTICALS

(2Hrs/Week)

1. Determine the demand supply of forest products
2. Estimate the benefit-cost ratio of a forestry project
3. Formation of frequency distributions
4. Diagrammatic and graphical representation of data
5. Calculation of measures of central tendency
6. Calculation of measures of dispersion
7. Calculation of correlation coefficient
8. Calculation of regression coefficient
9. Tests of significance - Z test, t- test, Chi square test and F test
10. Analysis of variance- one way classification and two way classification
11. Layout and analysis of CRD and RBD

BOOKS FOR REFERENCE

- 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
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- 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
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- 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

Marks Including Choice

Unit	Marks
Module I	12
Module II	12
Module III	20
Module IV	16

KANNUR UNIVERSITY SIXTH SEMESTER BSc DEGREE EXAMINATION

6B12FOR - FOREST ECONOMICS AND FOREST STATISTICS

TIME: 3Hrs

MAXIMUM MARKS: 40

Part A - Short answer Questions ***Answer All***

(6 X 1 = 6)

1. Define forest economics
2. Define Regression
3. Define elasticity of demand
4. Define standard deviation
5. Define sampling
6. Define confidence interval

Part B- Short Essay Questions ***Answer Any Six***

(6 x 2=12)

7. Explain Law of demand
8. Compare fixed cost and variable cost
9. Explain scatter diagram
10. Advantages of CRD
11. Chi square test
12. Factors of production
13. Stratified sampling
14. Square root transformations

Part C- Essay Questions ****Answer Any Four***

(4 x 3=12)

15. Measures of central tendency
16. Correlation and types of correlation
17. Properties of Normal distribution
18. Transformation of data
19. Benefit cost analysis
20. Project cycle

Part D- Long Essay* Questions ***Answer Any Two***

(2 x 5=10)

21. Sampling and various types of sampling
22. Describe various experimental designs in forest statistics
23. Classification, tabulation and graphical representation of data
24. Explain in detail the valuation of various forest goods and services

CORE COURSE 13- FOREST ENTOMOLOGY, WILDLIFE MANAGEMENT AND FOREST PROTECTION

Semester	Course Code	Hours per week	Credit	Exam Hours
VI	6B13FOR	4+2	3	3

Course Outcomes

1. Understand the taxonomy and diagnostic features of various orders of class insect
2. Identification and management of the insect pests of forest trees and nursery
3. Carrying out wildlife census and surveys
4. Awareness on forest fire – control and prevention
5. Understand the various agents causing damages to forests and control measures

Module I: Forest Entomology

(16Hrs)

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 and Hemiptera. Beneficial role of insects. Useful insects – honey bees, silk worms and lac insects.

Module II: Insect pests of forest trees and nursery

(16Hrs)

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. Principles and techniques of Integrated Insect Pest Management - mechanical, physical, silvicultural, legal, biological and chemical. Classification of insecticides and their mode of action.

Module III: Wildlife Management

(16Hrs)

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. Threats to wildlife. Wildlife trade, CITES and TRAFFIC. Man-wildlife conflicts and mitigation measures. Threatened and Endemic species of mammals, reptiles, amphibians and birds of Western Ghats.

Module IV: Forest Protection

(16Hrs)

Forest Protection: Introduction - need of forest protection. Damages by human - 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. Advantages and disadvantages of forest grazing- rotational and controlled grazing, damage by alien invasive plants - methods to control including biological control.

Module V: Forest legislation

(8Hrs)

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 and amendments, Forest Conservation Act 1980. EIA Notification 2016.

PRACTICALS

(2Hrs/Week)

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
5. Study of insect pests of freshly felled trees and finished products
6. Exercise on the census techniques - direct methods

7. Exercise on the census techniques - indirect methods
8. Traps to study the wildlife - Pitfall trap, mist net, sherman trap, camera trap, and other traps
9. Working out relative abundance – encounter rates of direct sighting, encounter rates of indirect evidences and trap index

BOOKS FOR REFERENCE

- Dasmann, R.F. 1982. Wildlife Biology. Wiley Pub. New York.
- Rajesh, G. Fundamentals of Wildlife Management, Justice Home, Allahabad.
- Sawarkar B. Wildlife Management. Wildlife insitutue of India. Dehra Dun
- Khanna, L.S. 1984. Forest Protection, KhannaBandhu, 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

Marks Including Choice

Unit	Marks
Module I	13
Module II	13
Module III	13
Module IV	13
Module V	8

KANNUR UNIVERSITY SIXTH SEMESTER BSc DEGREE EXAMINATION

6B13FOR - FOREST ENTOMOLOGY, WILDLIFE MANAGEMENT AND FOREST PROTECTION

TIME: 3Hrs

MAXIMUM MARKS: 40

Part A - Short answer Questions **Answer All**

(6 X 1 = 6)

1. Define forest entomology
2. Shifting cultivation
3. Radio telemetry
4. Define wildlife census
5. Expand TRAFFIC
6. Counter fire

Part B- Short Essay Questions **Answer Any Six**

(6 x 2=12)

7. Mark-recapture method of wildlife census
8. Diagnostic features of the insect order Isoptera
9. Give the scientific names of honey bees used in apiculture
10. Name the insect pests and nature of damage of Bamboos
11. Global initiatives to control wildlife trade
12. Insect pests of freshly felled trees
13. Beneficial role of insects
14. Fire breaks and fire lines

Part C- Essay Questions ***Answer Any Four**

(4 x 3=12)

15. Biological control of insect pests
16. Comparative account on National Forest Policies
17. Environmental Impact Assessment
18. Types of forest fire
19. Salient features Wildlife Protection Act 1972
20. Man-wildlife conflicts and mitigation measures

Part D- Long Essay* Questions **Answer Any Two**

(2 x 5=10)

21. Give a detailed account on the wildlife census techniques
22. What are the major threats to wildlife? Explain the conservation measures of wildlife.
23. Describe briefly about various methods of insect pest management
24. Modern methods of forest fire management

CORE COURSE 14- FOREST PATHOLOGY, WOOD DEGRADATION AND WOOD PRESERVATION

Semester	Course Code	Hours per week	Credit	Exam Hours
VI	6B14FOR	4+2	3	3

Course outcomes

1. Awareness about diseases, symptoms and control measures of various tree diseases
2. Understand different agents that cause wood degradation and their control
3. Familiarize various methods of wood seasoning
4. Familiarize various methods of wood preservation

Module I: Forest Pathology

(16 Hrs)

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 II: Forest disease management

(15 Hrs)

Forest disease management – Definition, scope and principles. 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.

Module III: Wood Degradation

(25 Hrs)

Biodegradation of wood in use. Types of wood decay, gross characters of decay, sapstain, different types of rots in hardwoods, softwoods and their prevention. Graveyard test and decay resistant woods. Wood water relationship – shrinkage, swelling, movement, fibre saturation, equilibrium moisture content. Wood seasoning – merits, principles and types – air seasoning, kiln seasoning and chemicals seasoning. Refractory classes of timbers, kiln schedules. Seasoning defects and their control.

Module IV: Wood preservation

(16 Hrs)

Classification of timbers based on durability. Wood preservation – principles, processes, need, types of wood preservatives (Water soluble, oil based, etc.), Non-pressure methods – steeping, dipping, soaking open tank process, Boucherie process. Pressure methods – full cell process, empty cell process (Lowry and Rueping). General idea about fire retardants and their usage.

PRACTICALS

(2Hrs/Week)

1. Study of morphological characters of fungi
2. Familiarisation of general symptoms of forest diseases-field visit
3. Familiarisation of physiological diseases of forest trees- field visit
4. Familiarisation of common fungicides
5. Collection, observation and preservation of diseased specimens and pathogenic Structures
6. Preparation of culture media, isolation and subculturing of pathogens
7. Study of symptoms, causal organisms, host parasite relationship of representative disease of Teak, Rosewood, Sal, Ailanthus, Sandal, Neem, Casuarina, Eucalyptus and Bamboos.
8. Studies on defects in wood – natural and seasoning defects
9. Studies on wood boring insects
10. Graveyard test to determine natural durability of wood
11. Termite resistance test
12. Spot tests for penetrability of preservatives
13. Visit to preservative treatment plants.
14. Visit to saw mills to study stacking of timber and air seasoning practices

15. Visit to seasoning kilns.
16. Visit to Wood Testing Laboratory

BOOKS FOR REFERENCE

- Bakshi, B.K. Forest Pathology. 1976. Principles and Practices in Forestry. Controller of Publications, New Delhi.
- Khanna, L.S. 1984. Forest Protection, KhannaBandhu, Dehra Dun.
- Eaton RA and Hale MDC. 1993. Wood: Decay, Pests and Protection. Chapman and Hall.
- Findlay WPK. 1985. Preservation of Timber in the Tropics. MartinusNijhoff
- FAO Wood Preservation Manual. 1986. (FAO Forestry Paper No. 76).
- Richardson BA. 1993. Wood Preservation. E and FN SPON.
- Franze F.P Kollman and Wilfred A Coles. Principles of wood science and Technology Vol 1 & II Springer Verlag, Berlin.
- Barry A Rishardson . Wood preservation. Construction press London
- Metha and Thribhuvan. Hand book of forest utilisation. Periodical experts Book agency, Vivek vihar, New Delhi

Marks Including Choice

Unit	Marks
Module I	15
Module II	15
Module III	15
Module IV	15

KANNUR UNIVERSITY SIXTH SEMESTER BSc DEGREE EXAMINATION

6B14FOR - Forest Pathology, Wood Degradation and Wood Preservation

TIME: 3Hrs

MAXIMUM MARKS: 40

Part A - Short answer Questions **Answer All**

(6 X 1 = 6)

1. Etiology
2. Sapstain
3. PCP
4. EMC
5. Steeping
6. Give scientific name and order of Teak defoliator

Part B- Short Essay Questions **Answer Any Six**

(6 x 2=12)

7. Disease resistance
8. Chemical seasoning
9. Graveyard test
10. Physiological disorders
11. Types of water in wood
12. Oil based wood preservatives
13. Integrated disease management
14. Natural durability of timber

Part C- Essay Questions ***Answer Any Four**

(4 x 3=12)

15. Refractory classes of timber
16. Kiln schedules
17. Seasoning defects in wood
18. Fire retardants and its types
19. Non-pressure methods of preservative treatment
20. Major diseases of Neem

Part D- Long Essay* Questions **Answer Any Two**

(2 x 5=10)

21. Different types of wood seasoning
22. Classification of pathogens causing timber decay
23. Disease management in forest
24. Give a detailed account on different preservative treatments in wood

CORE COURSE 15- CORE PRACTICAL II

Semester	Course Code	Hours per week	Credit	Exam Hours
VI	6B15FOR	-	4	3

Practicals of the courses offered in 5th semester.

- Forest Resource Utilization and Wood Based Industries
- Forest Survey and Geoinformatics
- Forest Mensuration and Forest Management
- Forest Genetics, Tree Improvement and Biotechnology

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.

MODEL QUESTION PAPER

6B15FOR - CORE PRACTICAL II

Time: 3 Hrs

Max. Marks: 40

-
1. Analyse qualitatively the given sample A. Report the results and write the procedure. (8marks)
 2. Derive the formula to find the height of the tree in B (5 marks)
 3. Work out and Solve problem C (6 marks)
 4. Derive the formula to chain across the obstacle D (5 marks)
 5. Workout and solve problem E (3 marks)
 6. Identify and write the use of F and G (2x1 = 2 marks)
 7. Identify and write short note on H and I (2 x 2 = 4 marks)
 8. Spot at sight J,K,L,M,N,O (4x0.5=2marks)
- Viva-voce (5 marks)

Key to the specimens

A- Glucose/Fructose/Sucrose/Starch/Lactose/maltose/Protein

B- if the tree is on flat ground/if the 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

C- Volume of log/age of tree by three periodic measurements/GOB/GUB

- D– End points cannot be seen across but chaining possible/end points can be seen across but chaining is not possible/endpoints cannot be seen across but chaining is not possible
- E- GCA/SCA/heritability
- F, G – Non timber Forest products
- H, I – Wood panel products
- J, K, L, M, N, O –tissue culture equipments/Mensuration instruments/Surveying instruments

CORE COURSE 16- CORE PRACTICAL III

Semester	Course Code	Hours per week	Credit	Exam Hours
VI	6B16FOR	-	4	3

Practicals of the courses offered in 6th semester.

- Ecotourism, Urban Forestry and Landscape Management
- Forest Economics and Forest Statistics
- Forest Entomology, Wildlife Management and Forest Protection
- Forest Pathology, Wood Degradation and Wood Preservation

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

MODEL QUESTION PAPER

6B16FOR - CORE PRACTICAL III

Time: 3 Hrs

Max. Marks: 40

1. Prepare an ANOVA table for the given data, calculate the LSD and give your conclusions at 5% or 1% significance level (7 marks)
2. Test the significant difference between the samples based on the given data A (5 marks)
3. Workout and solve problem B (2 marks)
4. Name two species each suitable for C and D (1x2=2 marks)
5. Workout and solve problem E (3 marks)
6. Identify the specimens F and G, and write short note (2x2 = 4 marks)
7. Workout and solve problem H (3 marks)
8. Draw a diagram I for the given data (2marks)
9. Workout and solve problem J (2marks)
10. Identify the given specimen K and L and Write the nature of damage (2marks)

11. Write the procedure of wildlife census technique M

(3 marks)

Viva-voce

(5 marks)

Key to the specimens

A – Statistical data for Z test/independent t test/paired t test/chi square test

B – Estimation of Carrying capacity- RCC/ECC/PCC

C & D – Hedges/Pergola/Edges/Flowerbed/Carpet bed/Lawn/Topiary/ Arches/Avenues

E – Pearson Correlation coefficient/Spearman Rank correlation coefficient/Regression coefficient

F & G – Wood defects

H- Arithmetic mean/Median/Standard deviation/Quartile deviation/Mean deviation

I- Histogram/Bar diagram/Multiple bar Diagram/Component bar diagram/Pie Diagram

J- Problems on forest economics – NPV/BC Ratio/Equilibrium price

K & L- Insect pests

M- Total count/Block count/waterhole count/Dung count/Line transect/pug mark census/Mist net/Sherman trap/camera trap

CORE COURSE 17- FORESTRY FIELD EXPERIENCE

Semester	Course Code	Hours per week	Credit	Exam Hours
VI	6B17FOR	-	3	-

Each student shall undergo practical training and field works at the following areas/institutes and make detailed reports. 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 shall be evaluated by the external examiner at the end of sixth semester.

Module I: (I to IV Semesters)

- Visit to Natural forests to study forest types and composition
- Visit to forest plantations to understand practices of plantation establishment and management operations
- Visit to wood technology laboratory or research institute to familiarize various instruments and laboratory techniques in wood science and technology
- Visit to soil testing laboratory or research institute to familiarize various instruments and laboratory techniques in analysis of soil nutrients and properties
- Visit to Forest Nursery to study nursery management practices
- Visit to seed testing laboratories to familiarize instruments and laboratory techniques in various tests of forest tree seeds
- Visit to zoo and protected areas to study behavior and field identification of wild animals

Module II: (V & VI Semesters)

- Visit to Wood Based Industry to understand the practices of wood seasoning, wood preservation and manufacture of wood products
- Visit to an ecotourism site to conduct social survey to identify visitor satisfaction level, to identify environmental impacts, to develop alternate ecotourism product plan with existing facilities in the area and to conduct a stakeholder analysis.
- Visit to protected areas to understand the wildlife management practices.
- Visit to tribal hamlet to conduct ethnobotanical survey and practices on PRA techniques
- Visit to Forest Depot to understand depot management, grading of timber and procedure of sale.
- Visit to collection and processing centre of non timber forest produce.
- Visit to wildlife research institutes / captive breeding centre to familiarize tools and techniques in wildlife research, monitoring and conservation
- Visit to plant breeding centre / NBPGR to familiarize tools and techniques in tree improvement and germplasm preservation



KANNUR UNIVERSITY

SCHEME, SYLLABUS AND MODEL QUESTION PAPERS OF

GENERIC ELECTIVE COURSES

OFFERED UNDER

BSc. FORESTRY PROGRAMME

(2019 Admission onwards)

GENERIC ELECTIVE COURSES 1- ECOTOURISM

Semester	Course Code	Hours per week	Credit	Exam Hours
V	5D01FOR	2	2	2

Course Outcomes

1. Understand the different forms and categories of tourism
2. Understand the objectives and principles of ecotourism
3. Evaluate the ecotourism in protected areas
4. Determine the value and carrying capacity of a tourism destination

Module I

(18Hrs)

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.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 II

(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 III

(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*.JnanadaPrakashan.
 Chiranjeev, A. 2008.*Ecological, Social and Cultural aspects of Ecotourism*.JnanadaPrakashan.
 Chiranjeev, A. 2008.*Concept of tourism*.JnanadaPrakashan.
 Aaradhana, S. 2009. *Indian tourism, Wildlife tourism and Ecotourism*.JnanadaPrakashan. 288 p.

• **Marks Including Choice**

Unit	Marks
Module I	10
Module II	10
Module III	10

KANNUR UNIVERSITY FIFTHSEMESTER BSc DEGREE EXAMINATION

5D01FOR - ECOTOURISM

TIME: 2Hrs

MAXIMUM MARKS: 20

Part A - Short answer Questions ***Answer All***

(5 X 1 = 5)

1. Define ecotourism
2. Green consumerism
3. Mass tourism
4. Popular tourism
5. Sustainable development

Part B- Short Essay Questions ***Answer Any Three***

(3 x 2=6)

6. Elements of ecotourism
7. Ecotourism business plan
8. Forms of tourism
9. Travel cost method
10. Basic components of tourism

Part C- Essay Questions ****Answer Any Three***

(3 x 3=9)

11. Give an account on the impacts of ecotourism to the environment
12. Sociological dimensions of ecotourism
13. Write an account on ecotourism in any 4 protected areas of India
14. Types of Carrying capacity
15. Role of NGO's in ecotourism

GENERIC ELECTIVE COURSES 2- BIODIVERSITY CONSERVATION

Semester	Course Code	Hours per week	Credit	Exam Hours
V	5D02FOR	2	2	2

Course Outcomes

Understand biodiversity, its uses, values and levels.

Understand the legal and institutional measures to safeguard Indian biodiversity.

Awareness on protected area network in India and in Kerala

Knowledge on Intellectual Property Rights and GI products with special reference to Kerala

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 III

(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, Snowleopard, 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

• Marks Including Choice

Unit	Marks
Module I	5
Module II	10
Module III	10
Module IV	5

KANNUR UNIVERSITY FIFTHSEMESTER BSc DEGREE EXAMINATION

5D02FOR – BIODIVERSITY CONSERVATION

TIME: 2Hrs

MAXIMUM MARKS: 20

Part A - Short answer Questions ***Answer All***

(5 X 1 = 5)

1. Define biodiversity
2. Keystone species
3. Endemic species
4. Community reserve
5. Biosphere reserves

Part B- Short Essay Questions ***Answer Any Three***

(3 x 2=6)

6. levels of biodiversity
7. Hot spots of biodiversity
8. Biodiversity register
9. Difference between wildlife sanctuary and national park
10. Project tiger

Part C- Essay Questions ****Answer Any Three***

(3 x 3=9)

11. Write a short note on Western Ghats. Name four mammals endemic to Western Ghats.
12. Ethics in conservation
13. IUCN redlist categories and criteria
14. What is meant by Intellectual Property Rights? Which are the categories? Name four GI products from Kerala
15. Explain the uses and values of biodiversity

GENERIC ELECTIVE COURSE 3 - LANDSCAPING AND ORNAMENTAL GARDENING

Semester	Course Code	Hours per week	Credit	Exam Hours
V	5D03FOR	2	2	2

Course Outcomes

1. Understand the elements of landscaping
2. List out the components of landscaping
3. Elements of landscaping for specific situations and environments
4. Create a garden design

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.

MODEL QUESTION PAPER

Unit	Marks
Module I	10
Module II	5
Module III	10
Module IV	5

KANNUR UNIVERSITY FIFTHSEMESTER BSc DEGREE EXAMINATION

5D03FOR – LANDSCAPING AND ORNAMENTAL GARDENING

TIME: 2Hrs

MAXIMUM MARKS: 20

Part A - Short answer Questions ***Answer All***

(5 X 1 = 5)

1. Urban forestry
2. Topiary
3. Hedges
4. Pergolas
5. Butterfly garden

Part B- Short Essay Questions ***Answer Any Three***

(3 x 2=6)

6. Styles of garden
7. Avenue planting
8. Features of English garden
9. Landscaping for traffic islands
10. Importance of flowerbeds

Part C- Essay Questions ****Answer Any Three***

(3 x 3=9)

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

GENERIC ELECTIVE COURSE 4 - CLIMATE CHANGE IMPACT AND MITIGATION

Semester	Course Code	Hours per week	Credit	Exam Hours
V	5D04FOR	2	2	2

Course Outcomes

1. Understand the composition of atmosphere and weather parameters
2. Knowledge on global climate change issues and impacts
3. Knowledge on the functions of global bodies and treaties related to climate change
4. Design the climate change mitigation measures

Module I: Climate change –Introduction (9Hrs)

Structure and composition of atmosphere - weather elements- Climate and weather- scales of climate - Radiation balance, Role of Ozone, Green house gases and their global warming potential , Sustainable development goals and Climate change

Module II: Climate change impacts (9Hrs)

Climate change causes, Impacts on water, agriculture, livestock, forest, wildlife, human health and poverty, livelihoods, rural and urban areas. Extreme events of climate change with respect to India and Kerala.

Module III: Climate change-Mitigation and Adaptation (18Hrs)

National mitigation targets, National adaptation targets, Community interest in climate change adaptation, Green building concepts, Alternative fuel measures, Renewable energy related initiatives, Plantation, afforestation, reforestation and protection of forests, Waste management measures and Carbon capture, Role of global initiatives like UNFCCC, IPCC, WMO, Kyoto protocol, CDM, Paris agreement etc.

BOOKS FOR REFERENCE

1. Forestry-Principles and applications, Antony Joseph Raj and S B Lal
2. Global climate change and Biodiversity, Shyam S khinchi and MeenuTanwar
3. Climatology: Atmosphere, Weather and Climate, K Siddhartha
4. Micro level people's perception on Climate change, Kailash Chandra Malhotra, Saroj K barik and Brajesh K Tiwari
5. Climate change and India: Vulnerability Assessment and Adaptation, EdsShukla P R
6. Global climate change: causes and Consequences, M.Z.A Khan and SonalGangawala
7. Climate change, Vulnerability and Migration, S IrudayaRajan and R B Bhagat
8. Climate change and Agriculture, Pawan Kumar Bharti and AvnishChauhan

MODEL QUESTION PAPER

Unit	Marks
Module I	8
Module II	7
Module III	15

KANNUR UNIVERSITY FIFTHSEMESTER BSc DEGREE EXAMINATION

5D04FOR – CLIMATE CHANGE IMPACT AND MITIGATION

TIME: 2Hrs

MAXIMUM MARKS: 20

Part A - Short answer Questions ***Answer All***

(5 X 1 = 5)

1. Define climate
2. Define weather
3. Renewable energy
4. Expand UNFCCC
5. Carbon credit

Part B- Short Essay Questions ***Answer Any Three***

(3 x 2=6)

6. Weather elements
7. Ozone
8. Sustainable development
9. Greenhouse gas
10. Carbon trading

Part C- Essay Questions ****Answer Any Three***

(3 x 3=9)

11. Kyoto protocol
12. Clean Development Mechanism
13. Role of trees and forest in climate change mitigation
14. Impacts of global warming in water cycle
15. International agreements in climate change mitigation and adaptation

GENERIC ELECTIVE COURSE 5 –ORNITHOLOGY AND BIRD WATCHING

Semester	Course Code	Hours per week	Credit	Exam Hours
V	5D05FOR	2	2	2

Course Outcomes

1. Understand the basic ornithology, bird ecology and behaviour
2. Develop bird watching as a hobby
3. Basic skills on identification of common birds
4. Understand the bird migration and common migratory birds
5. Awareness on need for conservation of birds and their habitats

Module I: Basic Ornithology

(9Hrs)

Ornithology – definition, importance and brief history in India. Dr.Salim Ali and his contributions to Indian ornithology.Brief knowledge on bird morphology.Types and functions of feathers.Bird ecology and behaviour – communication, feeding and reproductive behaviour – mating and courtship.Nesting behaviour and types of nests.Locomotion - bird flight – adaptations and types.

Module II: Bird watching and Common birds of Kerala

(18Hrs)

The hobby of bird watching and its contributions to science.Online platforms and citizen science initiatives for bird watchers.Bird watching tools and techniques.Bird photography etiquette.Identification features and representatives of birds of Orders - Podicipediformes, Procellariiformes, Pelicaniformes, Ciconiiformes, Phoenicopteriformes, Anseriformes, Falconiformes, Galliformes, Gruiformes, Caradriformes, Columbiformes, Psittaciformes, Cuculiformes, Strigiformes, Caprimulgiformes, Apodiformes, Trogoniformes, Coraciformes, Upupiformes, Piciformes and Passeriformes.

Module III: Bird migration and Bird conservation

(9Hrs)

Bird migration – reasons and types.Mechanics of migration – timing of migration, duration of flight, direction of flight. Migratory birds of Kerala – threats and their conservation. Ecological role of birds.Need for conserving the natural habitat of birds. Water birds and their role in wetland conservation.

BOOKS FOR REFERENCE

- Neelakantan,K.K.1984. "KeralathilePakshikal". 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.
- Wallace GJ and HD Mahan. 20015. An introduction to ornithology. Mc Million Publishing Company, New York.
- Sashikumar C., Praveen J., Palot M. J. and Nameer P. O. 2012. Birds of Kerala – status and distribution. DC Books.

MODEL QUESTION PAPER

Unit	Marks
Module I	10
Module II	10
Module III	10

KANNUR UNIVERSITY FIFTHSEMESTER BSc DEGREE EXAMINATION

5D05FOR – ORNITHOLOGY AND BIRDWATCHING

TIME: 2Hrs

MAXIMUM MARKS: 20

Part A - Short answer Questions ***Answer All***

(5 X 1 = 5)

1. Define ornithology
2. Equipments in bird watching
3. Bird migration
4. Name two endemic birds of Western Ghats
5. Courtship behaviour

Part B- Short Essay Questions ***Answer Any Three***

(3 x 2=6)

6. Types of bird nests
7. Mating behaviour of birds
8. Feeding habits of birds with examples
9. Types of feathers in birds
10. Locomotion in birds with examples

Part C- Essay Questions ****Answer Any Three***

(3 x 3=9)

11. Charecteristic features and representatives of birds of order Passeriformes
12. Explain the citizen science initiatives of hobby bird watchers with case studies
13. Role of water birds in wetland conservation
14. Explain the reasons, patterns and mechanics of bird migration
15. Give a detailed account on threats to birds and their habitats in Kerala

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

ASWIN K.

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

2019

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**

2019