PFRI-EDUCATION BULLETIN NO: 2

PUNJAB FOREST SCHOOLS GHORAGALI & BAHAWALPUR

SYLLABUSES

FOR

DIPLOMA-IN-FORESTRY

AND

CERTIFICATE IN FORESTRY COURSES

PUNJAB FORESTRY RESEARCH INSTITUTE
FAISALABAD

GOVT. OF THE PUNJAB
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FOR

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C. Important nursery pests

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4. Insect control; General Principles of control,methods: Natural control,applied control,silvicultural ,Biological, Physical and chemical control; Spraying and dusting equipment.

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3. Grading and storage of timber; Grading rules and procedure for logs and timber of chir, kail, deodar, shisham, kikar, and mulberry. Grading of railway sleepers. Storage of logs and timber. Layout and types of depots, maintenance of depots records. Different methods of stacking with advantages and disadvantages. Measures for protection of timber in depots.

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5. Sale and disposal of forest produce. Different systems of sale and disposal of forest produce in different areas.

6. Organization of labour in forests. Organization and control of labour employed for felling, extraction, transport and disposal of timber and other forest produce. Basis and control of Job assignment.

7. Minor forest produce. Definition and relative importance of minor forest products. Detailed study of different kinds of minor forest produce and their sources including fibres and flosses, grasses, bamboos and canes etc. Distillation and extrac-

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6. Wind erosion and shelter belts.
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8. The hydrologic role of soil & Vegetation in a water-shed. The watershed in general terms. the hydrologic balance components of run off, Control of water yield by vegetation management.
9. Precipitation. Vegetation influences on precipitation. Water storage and movement in the soil, vegetation influences on soil water storage. Formation and types of precipitation. Measuring rainfall.
10. Erosion and sedimentation. Types of erosion. Geological erosion, its causes and effects, special and economic implications. Factors affecting rate of erosion. Erosion by raindrop splash, by running water, erodibility of soils vegetation influences on erosion. Sediment movement and depositio in streams and lakes, estimating rate of erosion, estimating sediment in streams.
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2. Silvicultural systems execution; Advantages and disadvantages Limitations and applicability of th- following silvicultural systems in Pakistan.

i. Clear felling system

ii. Uniform system

iii. Selection system

iv. Coppice system

v. Accessory systems.

10. FOREST SURVEY AND ENGINEERING

A. Forest Surveying

1. Introduction: Definition and kinds of surveys.
2. Scales : Types and construction of simple, diagonal and vernier scales.
3. Chain survey Gunter's and Engineer's chains, tapes metallic, and steel. Ranging rods , arrows and pegs. Ranging and chaining lines. Adjustment of chain. Use of prism square, cross staff and line ranger. Rectangular and oblique off-sets. Frame work of triangles. Choosing stations. Tie and check lines. Source of error. Chaining on slopes. Obstacles in chaining. Field book, conventional signs, Survey plotting.
4. Compass survey; prismatic compass, parts and uses; Forward, backward and reduced bearings. Use of prismatic compass in surveying, Magnetic and true meridian. Magentic needle. Local attraction. Open and close traverse. Common methods of plotting. Closing error and its distribution.
5. Plane table survey: plane table and its accessories. Methods of plane tabling. Fixing of position and orientation. Three points problem.
6. Levelling. Dumpy and tilting level. Levelling staff. Temporary adjustments. Methods of levelling, simple, compound, check and reciprocal. Level book and methods of recording. Reduction of level and arith-metical checks.
7. Bench marks; G.T.S. and permanent. Degree of accuracy. permanent adjustments of Dumpy level. Levelling for longitudinal and cross sections. Plotting. Use of Abney's level, Tangent clinometer, spirit level
8. Methods of contouring, contour lines, vertical, interval and horizontal equivalent.
9. Determination of areas by different methods. Reduction and enlargement of maps.
10. Theodolite; General description, handling, care and use.

B. Building Engineering

1. Selection of site, source of water and approach to road.

2. Lime, cement, their storage, surkhi and sand. Brick kiln. Housing timber and its defects. Timber joints, Elementary course in building construction.

3. Blasting.

4. Drawing: Plan section and elevation of simple building and preperation of estimates with plots lay out of simple buildings on grounds.

5. Construction of buildings, specifications, additions, alteration repairs and estimates.

C. Roads Engineering

1. Introduction: Types of roads and paths in forests, reconnaissance and location.

2. Road alignment. Gradient, camber, Construction and repair of retaining walls. Side and cross drains. Catch pits. Culverts and bridges.

3. Estimate of simple roads and bridges.

4. Use of Dumpy level. Road curves, cause ways and irish bridges.

D. Mechanical Engineering

Maintenance of Forest Machinery including chain saws

SURVEY AND ENGINEERING PRACTICALS

1. Practical in :
   i. Chain survey
   ii. Compass survey,
   iii. Plan table survey.
   iv. Longitudinal and cross section of road.
2. Survey drawings. At least three survey drawings of the above exercises will be prepared by each student of which one will be in ink and colour.
3. Practical exercise in road alignment.
4. Checking of Forest's boundary pillars.
5. Lay-out of plots of given size.
6. Plan, elevation and side view of a boundary wall and a single room.
7. Preparation of detailed estimates of a small building and road construction.
8. Working out quantities, preparing a bill of quantities and an abstract of cost.

11. GENERAL SILVICULTURE PART-III

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i. Dry areas with and without irrigation.

ii. Canal side.

iii. Denuded hill slopes and revine lands.

iv. Highway plantation.

v. Aesthetic planting.

vi. Coastal and inlands and sand dunes.

vii. Wind eroded ranges and farm lands.

viii. Waterlogged and saline areas.

ix. Land-slips.

2. Crop tending practices:

Definition and scope of weeding

Cleaning, pruning and thinnings. Detailed study of thinning types and grades.

3. Protection against frost, fire, grazing and man. Control and detection of damage in the forest.

4. Silviculture of forest species, Origin, distribution, site requirements, general description and Silvicultural characters of the following:-

Acacia nilotica, Pinus roxburghii, P. Wallichiana, Cedrus deodara, Picea smithiana, Mours alba, Salmalia malabarica, syzigium cumini Albizzia lebbek, Abies pindrow, Quercus incana, Robinia pseudo-acacia, Hybrid poplar, Eucalyptus camaldulensis, Terminalia arjuna Tamarix aphylla, Azadirachta indica, Juglans regia, Dendrocalamus strictus, Olea cuspidata, Acacia modesta, Dalbergia sissoo, Melia azedarach, Leucaena leucocephala. Prosopis cineraria

12. FOREST LAW.

1. Forest Act. 1927.

2. Land preservation (Chose) Act:

3. Cattle tress pass act:

4. Issue of damage reports. Damage report register, Seizure, right, compensation register, prosecution cases register. conduct in court.

5. Wildlife Act.

13. ENVIRONMENTAL FORESTRY AND WILDLIFE

1. An introduction to environmental forestry. Climatic and edaphic zones of Pakistan.
2. Definition of Eco-system and Bio-sphere.
3. Main divisions of eco-system.
4. Causes of air pollution and main pollutants.
5. Producers, consumers and decomposers.
6. The role of man in environment.
7. The role of forests in the environment.
8. Brief description of wildlife of Pakistan.
9. Economic importance of Wildlife.
10. Identification and distribution of Wildlife in Pakistan.
11. Wildlife resources, Ecology and management of Wildlife on farms, forests, Range lands and wildlife Parks in Punjab.
12. The need and importance of recreation, forests as a re-creation.

14. FOREST UTILIZATON PART-II

1. Structure of wood; soft woods and hardwoods, growth increments, sapwoods and heartwood, pores and vessels, resin canals, gum ducts, ripple marks, grain texture and figure, identification of important timbers.

2. Defects in wood. Knots, compression and tension, brashiness, defects due to direction of grains, shakes, frost injuries, pitch defects, bark pockets, miniral streaks and chemical stains, seasoning defects, sap-stain and decay, insect attack, pith flecks.

3. Wood seasoning. Its aims and objects, storage of logs and their drying. Methods of stacking timber including railway sleepers. Air and Kiln seasoning . Behaviour and advantage of seasoned timber in use. Moisture content: Specifications for various uses.

4. Wood preservation: Agencies of wood deterioration. Wood preservative preperation of material for wood treatment; conditioning of green wood. Treating process and cost of treatment, properties of treated wood. Factors affecting penetration and absorption, economic aspects of wood treatment. Sapstain and its prevention Fire retardants and their application.

5. Uses of wood. Characteristics and suitability of timbers for following end uses; building and construction work, packing cases and crates, Agricultural implements; axe, hammer and tool handles furniture and cabnet work, turnery articles and toys, railway sleepers and carriage building , electric transmission poles and mine props, ships and boat building. Textile mill accessories, pencils and penholders, sports goods, rifle, furniture, battery separators, match manufacture, mathematical instruments, flooring and parquetting.

6. Wood products and wood -based industries.

7. Saw milling and wood working.

8. Pulp and papers.

9. composite wood products.

15 RANGE MANAGEMENT

1. Introduction. Definition and importance of rangelands and range management; Range resources of Pakistan.

2. Basic principles of range management.

3. Basic concept in range management. The animal unit (A.U.), carrying capacity, intensity of use, frequency of use, Seasonal use, key species, key areas and indicator species

4. Management of rangelands and grazing systems.

5. Development and improvement of rangelands: Range suitability classification. Protection, control of water and erosion. Rehabilitations by natural and artificial means, Herbicides and fire, salting, fencing and herding.

6. Range livestock husbandry; Foraging habits of sheep, goats, cows and their improtance in range management.

7. Range plants.

16. EXTENSION EDUCATION

1. Definition of education and extension education.
2. Different forms of education: Formal, Non-formal and in-formal.
3. The scope and concept of extension education.
4. Programme planning and communication.
5. Learning and laws of learning.
6. Extension supervision and its basic principles.
7. Extension worker. Role of extension supervisors.
8. Extension education methods in detail.
9. Role of rural schools in Forestry Extension.
10. Extension publications.

17 FOREST MANAGEMENT

1. Introduction and scope of Forest management
2. Objectives of Forest Management
3. Forest resources and forestry economics
4. Regulation of yield by different methods
5. Organization of forest; compartment and sub-compartment, working circle, felling series, cutting sections, periodic blocks.
6. Preparation of working plan and schemes, their necessity and application of existing plans. Enumeration, stock mapping and description of compartment. Methods of study of vegetation, survey of vegetation, sampling etc. Instructions for collection of data.
7. Writing and posting of forest and plantation journals, compartment history files.

16. FOREST ACCOUNTS AND PROCEDURE

1. Duties and powers of various Forest Executive Officers.

2. Office procedure; Maintenance of office record, posting of register of books and maps, despatch register and receipt register, fire reports, drafting of letters, forms of official communicational letters, desi-official letters, memorandums, endorsements, reminders, telegrams, and teleprinters.

3. Executive orders, Sanction of engineering works, earnest money deposit, maintenance and disbursement of muster rolls, Maintenance of measurement books, damage report register, compensation register and prosecution register. preparation of prosecution case.

4. Government servants (efficiency and discipline) rules 1975, inquiry procedure, Government Servants (Conduct rules)

5. Travelling allowance rules.

6. Timber Accounts. Timber Forms No. 5 to 17.

7. Cash Account. Classification of revenue and expenditure, definition of the cash advance, C.R.S.P detail to be shown in monthly cash accounts.

   Introduction regarding the preparation of Range Accounts. Maintenance of Range Cash book and completion of monthly accounts.

8. Stores: Types, rules for purchase of tools. Register of stock maintenance. Conducting of stock rules. Disposal of unserviceable stores. Calculation of depreciation value.

10. AGROFORESTRY

1. Definition and concept of agroforestry and other similar terms like Farm forestry, social forestry, Extension forestry community forestry, Energy forestry and Participatory forestry etc.
2. Review of historical background of Agroforestry.
3. Ecological, socio-economic and institutional aspects of Agroforestry, importance of Agroforestry and social forestry in Pakistan. Interactions between plant and soil components of the system. Intemaction as a result of the addition of domestic animals to the plant-soil system.
4. Classification of Agroforestry systems ;Functions of trees used in combinations. Distribution of tree component in place and time.
5. Agroforestry systems and practices in use in Pakistan. Their establishment, cultural management and harvest techniques: Agroforestry as a strategy in economic development of the country.
6. Silvicultural treatments and techniques for Agroforestry systems. Criteria for the choice of tree species, criteria for the choice of planting stock, tree management; objectives, spacing of trees, type and time of thinning, degree and timing of pruning.
7. Agricultural management; Agricultural management will vary during different phases of tree crop; pre-planting phase, establishment phase, silvicultural management phase, matwring phase, harvesting phase. Harvesting and marketing in agroforestry.
8. Social forestry V/S traditional forestry, social forestry as a tool for local community development, productaion and management system of social forestry plantations (village woodlot/tree) farming in block, in line/singly/silvicultural pattern/agroforestry)

social forestry works carried out in Pakistan.

9. Agronomy-Brief introduction about agricultural crops to be raised in different seasons and their methods of raising and harvesting etc.

10. Farm land trees, their utilization, marketing and economy.

11. Diagnosis and design(D&D) Methodology(Brief introduction) Economic evaluation of Agroforestry systems.

12. Research needs in Agroforestry.

S Y L L A B U S

FOR

CERTIFICATE IN FORESTRY COURSE

Syllabus for Certificate-in-Forestry(Forest Guards)
Course of one year duration.

1. SILVICULTURE PART - I

1. Definition and scope of Silviculture, concept and importance of Forests. Knowledge of seedling and pole stages of a growing tree.
2. Locality factors of the forest.
3. Morphology: Root, stem, crown, development of straight and clear bole, bole defects and epicormic branches. Forest stand, evenaged and uneven aged forest stands, Pure and mixed forests. Canopy, dominant trees, dominated trees and suppressed trees.
4. Various tending operations, weeding, cleaning, thinning and pruning.
5. Different types of thinnings.
6. Nurse crops, cover crops, spacing and choice of species.
7. Different sowing and planting methods in different forests.
8. Regeneration, Natural and artificial regeneration methods.
9. Classification of trees according to their crowns.
10. Time of seed collection of various forest species and maintenance of seed stores.

2. FOREST UTILIZATION

1. Definition and scope of the subject. Uses of forest trees.
2. Instructions regarding felling, logging and sawing of forest trees. Different methods of felling and conversion of timber. Types of different implements used and season of felling.
3. Classification of converted timbers and firewood of forest species.
4. Kinds and purpose of different types of forest depots.
5. Methods of charcoal burning in charcoal kiln.
6. Resin tapping.
7. Apiculture and sericulture in brief.
8. Major forest and minor forest produce of Pakistan.
9. Seasoning and preservation of timber.
10. Identification of different timbers.
11. Transport means of forest produce.
12. Uses of wood.

4. FOREST LAW

1. General study of forest Act. 1927. The reserved and protected forests. The compounding of offences and the powers of a Forest Guard.
2. Filling in of preliminary offence/damage reports and 'supurd-nama'.
3. Compounding and prosecution of forest cases.
4. Check and issue of permits and challans.
5. Cattle trespass pass Act.
6. Wildlife Act.

5. FOREST SURVEY AND ENGINEERING

1. Definition and kinds of surveys
2. Use of tape, chain, prismatic compass, off setting and lay out of angles.
3. Map reading and preparation of various types of forest maps.
4. Measuring area on ground and map.
5. Reading of contour and horizontal distances.
6. Lay out and marking of nursery and other planting coupes.
7. Calculation of area by different methods.
8. Selection of site for building construction.
9. Knowledge of building materials: stones, bricks, cement, aand , lime and timber.
10. Digging of foundation, plinth, damp proof course and masonary work.
11. Knowledge of random rubble, English bond and Flamish bond.
12. Use of abney's level and spirit level.
13. Alignment of road: gradient, camber, culverts, side drains, breast wall, retaining wall, cross drain , and Irish bridge.
14. Maintenance of Forest machinery including chain saws.

SURVEY PRACTICAL

1. Chain Survey.
2. Use of compass for checking of forest boundary pillars.
3. Practical exercise in road alignment.
4. Checking of forest boundary pillars
5. Calculation of Area by different methods.

6. FOREST BOTANY

1. Definition of biology and botany.
2. Parts of plant (Morphology of tree).
3. Germination and methods of growth.
4. Function of leaf, root and stem.
5. Identification of very common forest trees and local grasses.
6. Various types of roots.
7. Collection, mounting and preservation of different species.
8. Absorption of water and mineral salts mechanism.
9. Photosynthesis.
10. Respiration.
11. Reproduction in flowering plants. Sexual and asexual (vegetative) reproduction.

FOREST BOTANY PRACTICAL

1. Seeds: various parts of seeds of dicots and monocots.
2. Leaf: Arrangement of leaves on stem;simple and compound leaves.
3. Stem: Aerial and underground stems.
4. Root: Various types of roots.
5. Identification of different plants.

7. SOIL CONSERVATION AND WATERSHED MANAGEMENT

1. Soil erosion by wind and water.
2. Types of soil erosion, sheet erosion, finger erosion and gullies.
3. Casuses of soil erosion: infilteration, run off, rain fall, winds and texture of soil.
4. Effects of soil erosion.
5. Measures to check erosion, terracing, check damming, planting, kas training, Spurs, bunds and control over grazing.
6. Wind erosion: stabilization of sand dunes (with wind breaks and shelter belts).
7. Hydrologic role of soil and vegetation in watershed.
8. Vegetation influences on erosion.
9. Precipitation. Influence of vegetation on precipitation and soil water storage.
10. Geological erosion. Its causes and effects.

8. SILVICULTURE PART -II

1. Nurseries: Selection of site.Lay out and irrigation. Types of different nurseries.
2. Irrigation techniques in nurseries and forests.
3. Brief knowledge of silvicultural systems.
4. Forest types of Pakistan.
5. Silviculture of shisham,Mulburry ,Kikar, Eucalputus,Poplar, Chir ,Kail,Deodar,Phulai,Olive,Simal,Bakain,Iple Iple and Neem in brief.

9. FOREST ACCOUNTS

1. Preparation of muster-roll and 'goshwara'
2. Preparation of bills.
3. Maintenance of form No. 5 & 6.
4. Maintenance of felling register.
5. Supervision of labour
6. Preparation of T.A. bills and contingent bills
7. Knowledge of arrival and departure reports. Handing and taking over charges. Appointment and conduct rules.

10. RANGE MANAGEMENT

1. Definitions of Range Management, Range land, pasture, Range site, Range trend, Climax type.
2. Basic principles of range management.
3. Knowledge of common pal-atable grasses.
4. Carrying capacity of the range. Seasons of use and intensity of use.
5. Range improvement practices.
6. Types of grazing systems.
7. Artificial and natural reseeding.
8. Livestock nutrition.
9. Various types of animal feed.
10. Groups of range plants.

11 PARKS AND WILDLIFE

1. Methods of wildlife management and development.
2. Wildlife resources in Pakistan.
3. Important diseases and their control on Wildlife animals.
4. Brief histories and distribution of following animals: Deer, Ibex, Urial, Nilgai, Partridges, Quails, Pheasants, Tiger, Lion, Bear, Peacock, Fish and Duck.
5. Economic importance of wildlife.
6. Definitions of game reserve, Game sanctuary and National Park and common wildlife found in them.

12. FOREST MENSURATION

1. Definition and objects of Forest mensuration.
2. D.B.H and measurement of dia. of standing trees.
3. Use of calliper and dia.tapes.
4. Measuring of height of trees by Abney's level and clinometer.
5. Basal area, and quarter girth formula
6. How to find the age of a tree.
7. Stacking of fire wood
8. Increment.
9. Volume tables and enumeration of forests.

FOREST MENSURATION PRACTICAL

1. Measurement of Volume of logs.
2. Measurement of height of standing trees
3. Use of different instruments.

13. EXTENSION EDUCATION

1. Definition of extension education.
2. The scope and concept of extension education.
3. Extension worker and role of extension supervisor.
4. Basic principles of extension supervision.
5. Programme planning and communic tion.
6. Various methods of extension education.

14. AGROFORESTRY

1. Definition and concept of Agroforestry and other similar terms like farm forestry, social forestry, extension forestry and community forestry.
2. Importance of Agroforestry and social forestry in Pakistan.
3. Classification of Agroforestry systems and their use in Pakistan.
4. Functions of trees used in combinations.
5. Criteria for the choice of tree species in agroforestry systems.
6. Social Forestry V/s traditional forestry and social forestry as a tool for local community development.
7. Farm land trees, their utilization, marketing and economy.
8. Brief introduction about agriculture crops to be raised in Agroforestry.