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2024 - 25

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- Forest Ecology & Environment
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FOREST SURVEYING & ENGINEERING + FOREST ECOLOGY, DENDROLOGY & ETHNOBOTANY

PAPER – 2

EDITION : 2024 – 25

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Module - 5

SYLLABUS

Indian Forest Service (IFoS) [Paper 2 | Section A] **Jharkhand PSC (ACF) Main 2024** [Paper 2 | Section A]	***Surveying and Forest Engineering*** : ◈ ***Forest surveying*** - different methods of surveying, maps and map reading. ◈ Basic principles of ***forest engineering*** - Building materials and construction. ◈ ***Roads and Bridges*** - General principles, objects, types, simple design and construction of timber bridges.
Indian Forest Service (IFoS) [Paper 2 | Section B] **Jharkhand PSC (ACF) Main 2024** [Paper 2 | Section B] **Jharkhand PSC (RFO) Main 2024** [Paper 2]	***Forest Ecology*** : ◈ ***Biotic*** and ***Abiotic Components***, forest ecosystems; forest community concepts; vegetation concepts, ecological succession and climax, primary productivity, nutrient cycling and water relations. ◈ ***Physiology in Stress Environments*** (drought, water logging salinity and alkalinity). ◈ ***Forest Types*** in India, identification of species, composition and associations. ◈ ***Conservation Of Forest Ecosystems***. ◈ ***Clonal Parks***. ***Dendrology*** : ◈ ***Taxonomic Classification***, principles and establishment of herbaria and arboreta ***Ethnobotany*** : ◈ ***Role of Ethnobotany*** in Indian Systems of Medicine; Ayurveda and Unani. ◈ Introduction, nomenclature, habitat, distribution and botanical features of ***Medicinal*** and ***Aromatic Plants***. ◈ Factors affecting action and ***Toxicity of Drug Plants*** and their chemical constituents.

Module - 5

CONTENT

INDIAN FOREST SERVICE (IFoS) PYQs [2008 to 2023]

FOREST SURVEYING & ENGINEERING

2024	• Differentiate between ***Traverse Surveying*** and ***Chain Surveying*** [P2/1(d) | 8 M]. • Differentiate amongst ***Contour Line***, ***Contour Gradient*** and ***Contour Interval***. Describe the characteristics of contours [P2/4(c) | 10 M].
2023	• What do you understand by ***Bridges*** and ***Culverts***? Write the types of any two bridges with sketches [P2/4(c) | 10 M]. • Give a list of materials used in ***Construction of Building*** and describe the characteristics of any two materials [P2/3(a) | 15 M].
2022	• Write the general ***Principles of Surveying***. Describe (i) direct methods of chaining on sloping ground, and (ii) chaining when vision is obstructed, but chaining is free [P2/2(b) | 15 M]. • Explain the ***Single-Line*** and ***Double-Line*** Field Books with neat sketches. Mention the steps followed in the field work of Chain Survey [P2/3(b) | 15 M]. • Describe the major considerations of ***Road Alignment*** in the plains. Explain the terms (i) Gradient, (ii) Camber, and (iii) Drainage related to roads in the hills [P2/1(c) | 8 M].
2021	• Explain the term (i) True meridian, (ii) Magnetic meridian, (iii) ***Reduced Bearing***, and (iv) Fore and back bearing [P2/1(e) | 8 M]. • What are the advantages and disadvantages of ***Plane Table Surveying***? Describe Radiation, Intersection, Traversing and Resection methods of plane table surveying [P2/2(b) | 15 M]. • Describe structure of ***Suspension Bridge*** and Cantilever bridge. [P2/4(c) | 10 M].
2020	• Construction and maintenance of ***Forest Roads*** can be considered as an essential investment of forest growth. Comment [P2/1(e) | 8 M]. • What are the factors that cause foundation failure during construction of a ***Forest Building***? [P2/2(c) | 10 M]. • What are the basic details of an engineering design of a ***Timber Bridge***? What steps should be taken to ensure its durability? [P2/3(b) | 15 M]. • What are the objectives of forest surveying? How does topographic survey aid in forest planning and management? [P2/4(a) | 15 M].
2019	• Define ***Bridge*** and explain different types of bridge with sketches. [P2/1(d) | 8 M]. • Give a list of ***Survey Methods*** adopted in Forest. Describe the survey of forest when a river comes in the way of Survey line. [P2/3(a) | 15 M]. • Explain concrete and write the characteristics of good ***Concrete Mixture*** [P2/3(c) | 10 M]. • What is ***Brick*** ? Describe different types of bricks giving their characteristics [P2/4(c) | 10 M].
2018	• What is the importance of surveying in forestry? Discuss different methods of surveying to solve the forestry field problems. [P2/1(a) | 8 M]. • Give the ***Classification of Forest Roads***. What features are required for a reconnaissance for forest roads? [P2/1(d) | 8 M].

2017	• Describe the ***Dead*** and ***Live Loads*** and how they are calculated on the roof trusses over buildings? [P2/3(c) | 10 M].
2016	• Enumerate the methods of direct ***Linear Measurements***. Discuss in brief the application of prismatic compass in forest survey [P2/2(d) | 10 M]. • Distinguish the ***Irish Bridge***, Simple ***Wooden Bridge*** and ***Suspension Bridge*** with details and neat sketches [P2/3(c) | 15 M].
2015	• ***Topographic Surveys*** are found useful in forest management. Discuss [P2/1(b) | 8 M]. • Which are the basic factors you have to look for before running out a survey lines in chain survey? [P2/1(e) | 8 M]. • How will you fined the reduced levels of the given points by height of collimation methods and rise and fall method and then check arithmetically? [P2/3(a) | 15 M]. • In a forest survey, you are provided a ***Prismatic Compass***. How will you accomplish the bearings of line AB? [P2/3(c) | 10 M].
2014	• How is ***Compass Survey*** done? what are the advantages of compass surveying? [P2/4(a) | 15 M].
2013	• Define the ***Arches*** used in construction. What are the different characteristics required in an arch? [P2/3(b) | 10 M]. • Describe all the ***5 Kinds of Chains*** used in survey and advantages and disadvantages of chain surveys [P2/3(c) | 8 M]. • Write down the ***Chemical Constituents*** of earth (chemical formula and percentage range of contents) for manufacture of good quality of *bricks*. [P2/3(d) | 7 M]. • Find out the maximum and minimum pressures of a wall which is 60 ft long and 4.5 ft wide at the base of its footing, carrying loads at the following distances from the left hand side : 20 tons at 10 ft, 30 tons at 25 ft, 40 tons at 28 ft, 48 tons at 50 ft and 12 tons at 55 ft. [P2/4(d) | 15 M].
2012	• Describe the structure of ***Dumpy Level*** through a well labelled diagram. [P2/3(b) | 10 M]. • Discuss the "***Two-Point Problem***" - the special case of resection in Plain Table Survey. [P2/4(a) | 12 M]. • Describe the limitations and advantages of ***Plane Table Survey***. [P2/4(b) | 8 M].
2011	• Describe how you would continue the line with the chain only, When (20 m) [P2/4(a) | 20 M]. (i) A large river interrupts the chain line, and (ii) A forest area comes across the chain line • Explain the term [P2/4(b) | 10 M]. (*i*) Whole circle bearing, and (*ii*) Quadrantal bearing • Describe, with sketches of ***Suspension Bridge***. [P2/4(c) | 10 M].
2010	• Describe methods of using ***Prismatic Compass*** in forest surveys. [P2/1(f) | 8 M]. • Distinguish between ***Irish Bridge***, ***Suspension Bridge*** and ***Cantilever Bridge***. [P2/2(e) | 8 M].

FOREST ECOLOGY

2024	• Describe in brief the importance of ***Biogeochemical Cycles***. Compare between carbon cycle and nitrogen cycling [P2/6(a) | 15 M].
2023	• Describe the major attributes of forest ecosystem [P2/5(a) | 8 M]. • Explain different types of ***Biodiversity*** and describe various methods for its management [P2/6(b) | 15 M].
2022	• Discuss the components of a desert ecosystem. Write steps to control shifting of sand dunes [*Linked Q: Wasteland management* | P2/6(b) | 15 M]. • What are Commensalism, Amensalism, Mutualism and Symbiosis? Write the functions of an ecosystem [*Linked Q: Silviculture* | P2/8(c) | 10 M].
2021	• Justify the statement "Wild animals are one of the biotic components of the forest ecosystem" How do they help in forest regeneration? [P2/6(c) | 10 M].
2020	• Why is carbon cycle important? How do human activities affect ***Carbon Cycle***? [P2/6(c) | 10 M]. • Describe the ***In-Situ*** biodiversity conservation with reference to Biosphere Reserves [P2/5(e) | 8 M]. • What do you mean by ***Population Diversity***? What are the different methods to measure biodiversity? [P2/6(a) | 15 M].
2019	• What are ***Ecological Pyramids***? Explain different types. Mention the implications of concepts of ecological pyramids in understanding forest ecosystems [P2/7(c) | 10 M]. • Describe the features and importance of ***Clonal Parks*** in forest conservation [P2/5(a) | 8 M].
2018	• What is ***Carbon Sink*** *?* How do forest soils act as important carbon sinks? [P2/5(b) | 8 M]. • Forest ecology is the study of complex interactions between organic and inorganic components of the forest ecosystem. Explain organic and inorganic components providing two examples of each as they relate to the forest ecosystem [P2/5(c) | 8 M]. • What is the ecological and economical importance of ***Biodiversity***? Mention the salient measures for conservation of biodiversity [P2/5(d) | 8 M].
2017	• Discuss the term ***Biodiversity***. Explain the levels in which it can be studied. What are the different measures employed to measure biological diversity? Elaborate [**P1**/6(a) | 20 M].
2016	• Garg (1988) described the ***Ecological Pyramid*** as a graphical representation of relationship between the trophic levels of an ecosystem. Explain with the help of neat diagrams [P2/5(a) | 10 M]. • Define ***Ecological Amplitude***. Describe the classification and characters of plant communities [P2/8(d) | 10 M].
2015	• Why is ***Carbon Recycling*** important? What are its influences on climate? Discuss your points for or against [P2/6(a) | 10 M].
2014	• Which are the six major attributes of an ecosystem-explain in detail [P2/5(b) | 8 M].

2013	• Describe the ***Qualitative Characteristics*** of plant community [P2/8(e) | 5 M]. • Discuss about the different kinds of ***Food Chains*** in different habitats and ecosystems [P2/5(d) |8]
2012	• What is the role of different techniques involved in connection with conservation and multiplication of threatened species? [**P1**/6(g) | 5 M]. • Describe Raunkier's life forms [P2/5(e) | 8 M]. • Discuss "ecological amplitude" and the law of tolerance" in the context in which they are generally used [P2/6(d) | 6 M]. • Discuss the phytosociological analysis describing formulae for calculation of [P2/7(a) | 15 M]. (i) Frequency and relative frequency, (ii) Density and relative density (iii) Abundance (iv) Relative dominance, and (v) Importance value index (IVI) • Explain with the help of suitable examples the various kinds of Population Interactions during their growth period and give difference between ***Commensalism*** and ***Amensalism*** of plant relationship [*Linked Q : Silviculture* | P2/7(a) | 10 M]. • Write short notes on – [**P1**/8 (a, e, f) | 5 × 3 = 15 M]. (1) Source-sink relationship with respect to carbon cycle (5 m). (2) Energy flow model in ecosystem (5 m). (3) ***Ex-situ*** and ***in-situ*** conservation (5 m). • Describe the mathematical expression for Biotic Potential and Environmental resistance [*Linked Q : Wildlife* | P2/6(c) | 6 M].
2011	• Discuss the direct use ***Value of Biodiversity*** [**P1**/5(d) | 10 M]. • Name the biodiversity ***Hot Spots*** in India. Discuss the major threats to biodiversity [**P1**/7(d) | 10 M]
2010	• "Tropical regions are rich in floral biodiversity as compared to temperate regions" Do you agree? [**P1**/1(f) | 5 M]. • Differentiate between the following – (*iv*) ***Net Primary Production*** and ***Yield*** [**P1**/3(a) *iv* | 5 M]. • What do you understand by the term '***Hot Spot***' in relation to floral biodiversity? Explain methods of ***Ex-Situ*** and ***In-Situ*** conservation [**P1**/7(a) | 10 M]. • How are different parameters used in System Ecology? [P2/8(b) | 10 M].

DENDROLOGY

2024	• What are the different steps for preparation of ***Herbarium Specimens***? [P2/5(b) | 8 M].
2023	• What are the different types of ***Plant Classification Systems***? Name the one which is mostly followed in Indian herbaria [P2/8(c) | 10 M].
2021	• What are holotype, neotype, lectotype and syntype of plant science? Describe the role of arboreta and ***Clonal Parks*** in conservation of biodiversity [P2/8(b) | 15 M].
2017	• Define ***Herbarium*** and write its significance. What are the steps in establishing herbarium and

	which method of plant classification is followed in herbarium arrangement? [P2/5(a) | 8 M].
2010	• List merits of ***Bentham*** and ***Hooker*** system of plant classification used in dendrology [P2/5(d) | 8 M].

ETHNOBOTANY

2024	• How does the knowledge of Ethnobotany contribute in the ***Indian System of Medicines***? [P2/7(c) | 10 M].
2022	• Describe the principles of ***Ayurvedic System*** of treatment. Write scientific names of five common tree species used in Ayurveda [P2/5(d) | 8 M].
2021	• Discuss the role of ***Tree Domestication*** in biodiversity conservation [**P1**/8(c) | 10 M]. • Write the scientific name of ***10 Medicinal Plants*** and their uses [P2/7(a) | 15 M].
2018	• Define ethnobotany. Write in detail about the role of ethnobotany in ***Modern Medicine*** and its approaches to the drug industry [P2/7(a) | 15 M]. • Enlist the common and scientific names of trees and shrubs (seven each) having medicinal importance in ethnobotany [P2/7(c) | 10 M].
2017	• What is ethnobotany and describe the role of ethnobotany in the ***Indian Systems of Medicine*** [P2/5(e) | 8 M].
2016	• The knowledge of ethnobotany helps to identify viable medicinal plants for ***Pharmaceutical Industries***. Explain [P2/5(b) | 10 M].
2015	• Give the scientific names of at least five drug yielding plants with their use in ***pharmaceutical industry*** [P2/5(e) | 8 M].
2013	• Write short notes on the following medicinal plants [P2/7(d) | 4 × 2.5 M]. (*i*) Aconitum heterophyllum (*ii*) Orchis latifolia (*iii*) Podophyllum emodii (*iv*) Morchella esculanta • Write critical notes on any four of the following – [P2/8(b) *iii* | 3 × 2.5 M]. (*iii*) ***Siddha system*** of medicines (2.5 m). (*iv*) Drugs of Alkaloids (*v*) Biological evaluation of Drugs
2012	• Describe the economic importance of *Acacia nilotica*, *Terminalia belerica*, *Vitex negundo* and *Madhuca latifolia* in detail [**P1**/7(d) | 10 M].

CHAPTER 1

FOREST ROADS & BRIDGES

Chapter outline

1.1 FOREST ROADS

Road is an open and wide way connecting one place to another and makes it easy to move vehicles and people. If these roads are constructed in or around the forest areas, they are called **Forest roads**.

TYPES OF ROADS

- Based on the time period, it will be used.

TEMPORARY	PERMANENT
	
Usable only for dry & winter Months	All weathered and motorable road

- Based on **LOCATION** : (a) inside the forest, and (b) peripheral road
- Based on **USE**
  - (i) **Main motorable road** : main road connected HQ to the forest block, important rest houses and forest depots. They are the metalled road with well-drained and are being used throughout the year.
  - (ii) **Branch (Feeder) Jeepable road** : these are the feeder road connecting interior forest areas with the main road. These are the usual earth roads, though in some cases, the surface may be improvised by spreading sand, gravel, or laterite stones.
  - (iii) **Bridle paths** : Prepared for a quick and direct route from place to place to transport the timber by animals.
  - (iv) **Inspection paths** : the narrow path of 06 to 1-meter width, usually constructed in and around each sub-compartment, make them assessable

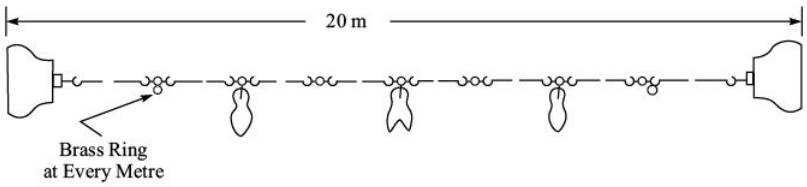


Figure : 20 m chain

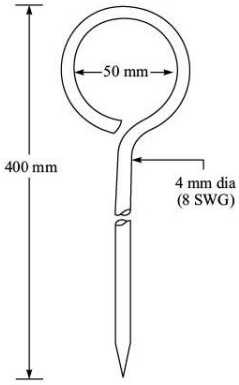


Figure : Arrow

- **Engineers chain** : It is 100 ft long and is divided into 100 links. So, each link is of 1 ft. Tallies are provided at every ten links (10 ft), the central tally being round. Such chains were previously used for all engineering works.
- **Revenue chain** : 33 ft long and divided into 16 links

IFoS 2016 : Enumerate the *methods of direct linear measurements*. Discuss in brief the application of *prismatic compass* in forest survey (10 m).

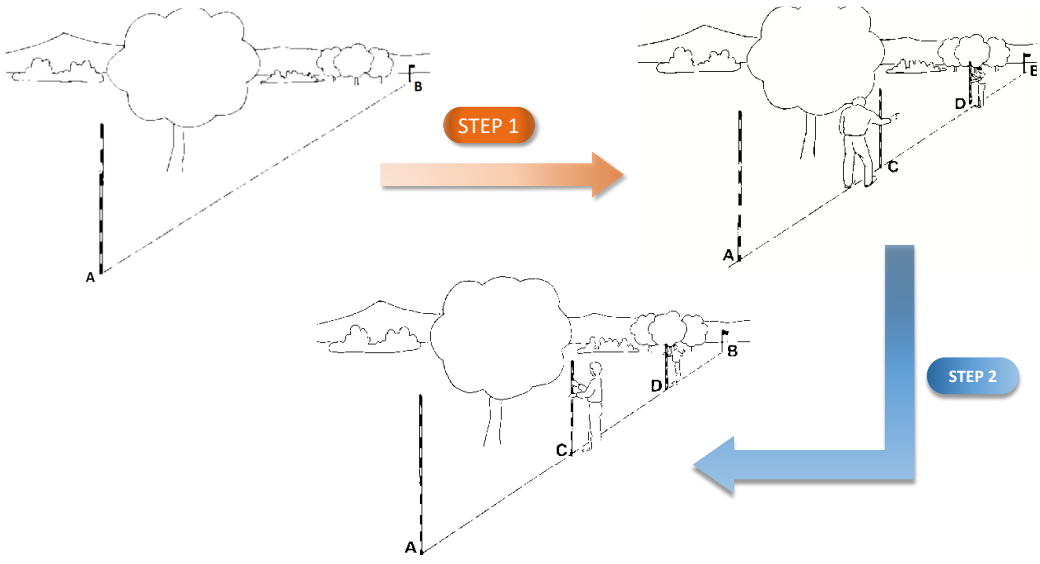
Hints : The direct method is the common method that employs a chain, tape, passometer or any other instrument to measure the linear distance.

3.3 RANGING

Ranging is the process of establishing intermediate points on a straight line between two points. It must be done before a survey line is chained.

TYPES OF RANGING

- **Direct ranging** : when both end stations are visible. A surveyor can do this with the help of an assistant. The surveyor remains at one station and sends an assistant forward with a rod to the place where it is desired to set it up. The assistant aligns himself roughly along the chain line and, holding the rod at arm's length, faces the surveyor to receive directions.



The surveyor, standing at a distance of a meter or two from the nearer rod, places his eye in line with the two rods which are already in position. He now signals his assistant, by waving his hand, to move

CHAPTER 4

CHAIN SURVEY

Chapter outline

4.1 DEFINITION

Chain surveying is the method of land surveying in which only linear measurements are taken with the help of a chain and no angular measurements are recorded. Here, the tie lines and check lines control the accuracy of work.

4.2 PRINCIPLE

The principle of chain surveying is **triangulation**. This means the entire targeted area that needs to be surveyed is divided into a number of small triangles which should be well-conditioned.

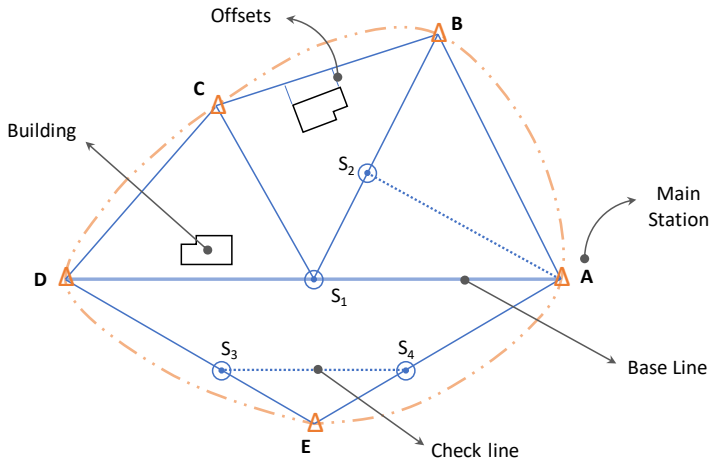


Figure : A network of triangles

A CHAIN SURVEY IS RECOMMENDED WHEN

- The ground surface is more or less level, *i.e.,* river flat plains or valleys.
- The surveyed area is small
- The formation of the well-conditioned triangle is easy
- When we required a small-scale map.

CHAPTER 6

PLANE TABLE SURVEY

Chapter outline

6.1 INTRODUCTION

Plane table surveying is a graphical method of survey in which the field observations and plotting are done simultaneously. A plane table survey does not involve the use of a field book. It is mainly suitable for filling interior details when traversing is done by theodolite.

6.2 PRINCIPLE

parallelism, meaning that the rays drawn stations to objects on the paper are parallel to the lines from the stations' objects on the ground. The relative positions of the objects on the ground are represented by their plotted positions on the paper.

6.3 ACCESSORIES OF A PLANE TABLE

- **Plane table** : a well-seasoned drawing table of wood 75 cm by 60 cm in size. The top surface of the table is well-leveled
- **Alidade** : a metallic ruler with a sight vane
  - **Plane Alidade** : consists of a metal or wooden ruler of length of about 50 cm
  - **Telescopic Alidade**: consists of a telescope meant for inclined sight or sighting distant objects clearly.
- A **spirit level** : a small metal tube containing a small bubble of spirit. The bubble is visible on the top along a graduated glass tube. Uses - to levelled plane table every time
- **Trough compass** : to fix the direction of a table
- **Circular Box Compass** : It carries a pivoted magnetic needle at the center. The circular box is fitted on a square base plate.
- **U Fork** with **plumb bob** : for cantering plane table at a targeted point. Uses - to centering the table over a station.

CHAPTER 8

BUILDING MATERIAL

Chapter outline

Building materials have an important role to play in this modern age of technology. Although their most important use is in construction activities

8.1 STONE

Stones used in construction are derived from the rocks forming the crust of the earth's surface.

TYPES OF ROCKS

- According to geological formation : (a) igneous rock, (b) Sedimentary rock and (c) Metamorphic rock.
- According to chemical composition : (a) Siliceous Rocks, *i.e.,* Granite. (b) Calcareous Rocks, *i.e.,* Limestone. (c) Argillaceous Rocks, *i.e.,* Slate.

PROPERTIES OF GOOD STRUCTURAL STONE

- Strong against crushing forces
- Durability
- Hardness and toughness
- Appearance : Stones with lighter shades are preferable.
- Availability: Large size blocks of stones should easily be available, and it should be cheap.
- Stones should have the ability to receive polish and paint when used for facework.
- Stones should be resistant to fire
- Fineness of grain

TYPES OF BUILDING STONES

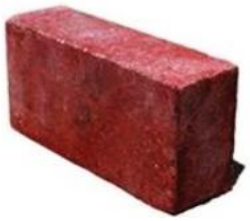
- Granite
- Basalt
- Limestone & Chalk
- Sandstone
- Laterite

CLASSIFICATION OF BUILDING BRICKS

Bricks are broadly classified into two broad categories

IFoS 2019 : What is *brick* ? Describe different types of bricks giving their characteristics (10 m).

- **Sun-dried bricks**, or un-burnt or *Katch bricks* : dried directly under the sun after the process of moulding. These bricks are of inferior quality and are used for the construction of temporary and cheap structures.
- **Burnt bricks** : superior in quality and are used for civil engineering constructions. Burnt bricks are further classified according to the state of burning –

First Class Bricks	Bricks have standard dimensions (19 × 9 × 9 cm) with sharp edges, uniform colour, even surface, correctly burnt, hard and free from Salt deposits and cracks [Free from any defect]. **Uses** : These bricks are used for superior quality works and works of permanent nature, i.e., Architectural work, exterior walls, etc.	
Second Class Bricks	They may have a slight irregularity in size, shape, colour or may have slight cracks. These bricks are hard and are correctly burnt and used where the brick masonry is to be plastered, *i.e.*, Interior walls and Exterior walls with plastering.	
Third Class Bricks	They are not fully burnt bricks. They are Irregular edges with less sharpness, uneven surfaces and are not hard enough. It does not create a metallic sound. **Uses** : unimportant and temporary constructions	
Fourth Class Bricks	They are either over burnt or under burnt with irregular shapes, edges and surfaces. These are used as aggregates for concrete in road, floor and foundation construction	

► **On the basis of Shape**

- Bull-nosed bricks : A brick moulded with a rounded angle is termed the bullnose. It is used for rounded quoin. A quoin is a connection which is formed when a wall takes a smooth circular turn.
- Cant or Plinth Bricks : This has a slant-cum-straight edge at one end which is used in a plinth or in a door and window joints.
- Circular Bricks : These bricks are provided with internal and external

CHAPTER 9

BUILDING CONSTRUCTION

Chapter outline

9.1 INTRODUCTION

Forest managers are required to construct different types of building like office buildings, staff quarters, Nursery stores, rest houses, etc. in various localities. Hence the design, construction and maintenance of such buildings are very important aspects of their jobs which should be carried out properly and in a systematic manner

TYPES OF BUILDINGS

- Administration buildings
- Residential buildings, *i.e.*, Staff quarters, Hostels,
- Storage buildings, *i.e.*, Nursery storage
- Educational buildings, *i.e.*, Training center
- Forest chaukies

COMPONENTS OF BUILDING

- **Sub-structure** or **foundation** : It is the lower portion of a building, usually located below the ground level, which transmits the load of the super-structure to the supporting soil.
- **Super structure** : It is a part of structure which is above ground level, and which serves the purpose of its intended use.

A building has the following components : Foundations, Masonry (Walls & columns), Floor, Roof, Doors & Windows, Stairs, etc.

SITE SELECTION

The chief considerations that govern the choice of site for a forest building are

- Situation and Accessibility : Select a place near a forest village or strategic locations, *i.e.*, waterhole, Road-railway connectivity, entry gate of National parks or Wildlife sanctuaries, etc.
- Good water supply: For construction, Nursery and domestic use.

Fidelity 1 : Plants appearing accidentally.

Fidelity 2 : Occur in many communities but predominant in one (*i.e.,* desert).

Fidelity 3 : Occur only in one particular community and not in others (Exclusives).

> **IFoS 2016** : Define *ecological amplitude*. Describe the *classification and characters of plant communities* (10 m).
>
> **IFoS 2012** : Discuss "ecological amplitude" and the **law of tolerance**" in the context in which they are generally used (6m).

- Dominance : It has been described under quantitative characters. Here, the dominance is expressed in synthetic form. On the basis of density, frequency, and dominance (cover) values, there has been proposed the idea of importance ***value index***.
- *interspecific association* and *association index*
- index of similarity
- dominance index
- species diversity and diversity index

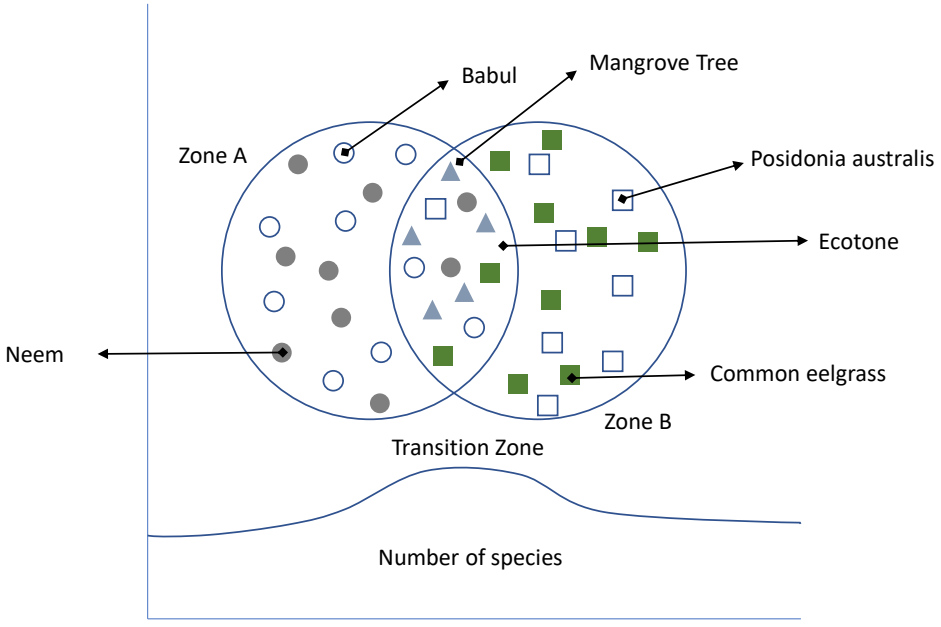
10.7 ECOTONE

An ecotone is an area that acts as a boundary or a transition between two ecosystems. A common example could be an area of marshland between a river and its riverbank or the border between forest and grassland. Ecotone is a region where the *influence of two different patterns of environment works together* and hence the *vegetation of ecotones is highly specialized*. An ecotone may be narrow or wide. Ex: the ecotone between the pond and the adjutant upland is narrow whereas the ecotone between the river and the sea is very wide.

Shannon's Index

To determine the biodiversity Shannon's biodiversity index is most widely used.

$$H' = -\sum_{i=1}^{i=s} p_i \log_e p_i \quad H' = -\sum_{i=1}^{i=s} p_i \log_e p_i$$



- Ecotone harbor the significantly greater number of species and diversity of most of the species is higher than the in neighboring community.

CHAPTER 11

TAXONOMY

Chapter outline

11.1 TAXONOMY

Taxis (Arrangement) + nomos (Law)

Taxonomy is the study of principles and procedures of plant identification, nomenclature, and classification.

So, Key elements of Taxonomy –

- **Identification** : A process by which an organism is recognized from the others by an already known organism and is assigned to a particular taxonomic group is called identification.
- **Nomenclature** : Naming an organism according to international scientific rules is called nomenclature.
- **Classification** : A process by which an organism is grouped into convenient categories on the basis of some easily observable characters.

Note : **Dendrology** : A branch of forestry that deals with the taxonomy of trees and other woody, plants including nomenclature, classification, identification, and distribution. *(Virtually dendrology works as a branch of taxonomy that deals with trees).*

Systematics : A branch of taxonomy deals with the study of diversity of an organism as well as establishing comparative and evolutionary relationships among them based on its anatomy, ecology, physiology and biochemistry comparison.

11.2 TYPES OF TAXONOMY

Alpha taxonomy : The identification and classification of organisms based on only morphological characters is called alpha taxonomy.

Beta taxonomy : it involved not only gross morphological features but also genetic, anatomical, cytological, palynological (pollen and pores study), physiological and other characteristics. It is also called ***biosystematics***.

Omega taxonomy : Analysis and synthesis of all information and types of data to develop a classification system based on phylogenetic relationships.

CHAPTER 12

HARBERIUM

Chapter outline

IFoS 2021 : What are *holotype*, *neotype*, *lectotype* and *syntype* of plant science ? Describe the *role of arboreta* and *clonal parks* in conservation of biodiversity (15)

IFoS 2017 : Define herbarium and write **its significance**. What are the **steps in establishing herbarium** and which **method of plant classification** is followed in herbarium arrangement? (8 m).

12.1 HARBERIUM

A herbarium is a *collection of dried specimens* and arrangements of specimens in the sequence of an *accepted classification* for reference or other scientific studies.

- "Herbarium" is used in its original sense. However, Today herbarium is not only with preserved plant specimens but also with certain botanical activities libraries about medicinal plants.
- The procedure of pressing and drying specimens for storage has been successful in terms of preservation of detail and specimen longevity, and the plants so preserved provide a concrete basis for past, present, and future studies.

12.2 IMPORTANCE OF HERBARIUM

- It is an invaluable conservatory of plant material and data.
- It is a storehouse of a large *collection of specimens*, so it becomes the source of taxonomic information and canter for research, teaching, and public information.
- Serves as a fundamental resource for the identification and classification of the plant kingdom
- Ex-situ conservation of genotype and serves as a source for a search of new genetic material for the improvement of cultivated stock.
- is the only source of information.
- The tags of herbarium carry all the information about habitat, habit, local name, flower color, and other characters of the plant, use of the plant, frequency, and abundance of species, etc.

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