

# Hornbill Forestry Test-3

Forestry

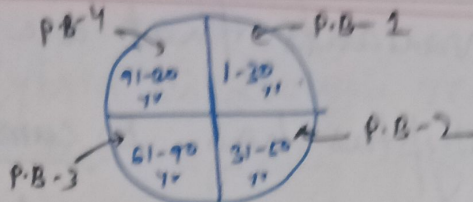
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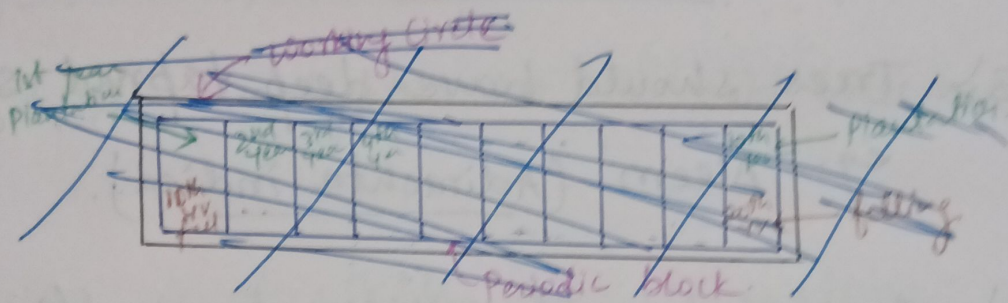
8:35-

Ans 1

Ans (a)



Periodic block is whole or part of ~~wooding~~ forest ~~circle~~ which is felled ~~in~~ and planted ~~in a time band~~ ~~usage~~, based on age class



## YIELD REGULATION

1) Consider ~~plantation~~ <sup>Chir Pine</sup> plantation in ~~20 ha~~ <sup>120 year</sup> rotation ~~plot~~

↳ ~~plantation~~ <sup>It</sup> has ~~rotation~~ <sup>Regeneration</sup> of ~~120~~ <sup>30</sup> yrs.

2) ~~each year we plant 2ha plot~~

↳ ~~so by 10<sup>th</sup> year all 20ha is planted~~

3) ~~In 10<sup>th</sup> year~~

↳ ~~1<sup>st</sup> 2ha is harvested.~~

2) We ~~divide~~ <sup>keep</sup> site into  $\frac{120}{30} = 4$  periodic block.

3) Each PB has age class of ~~120~~ 30 years.



~~is essentially in the year.~~

~~1st periodic block is replanted~~

4) Each PB is felled at end of regeneration.

In this way we get constant yield.

5) Used in Uniform shelterwood system.

Ans (b)

Tactical harvest planning is short-term planning of harvesting operation within a strategic harvesting plan.

It is done on annual or bi-annual basis

It considers

- 1) Annual allowable cut
- 2) Availability of labour, resources.
- 3) Condition of forest
  - ↳ age
  - ↳ size
  - ↳ pest.
- 4) Environment constraint.
  - ↳ wildlife habitat
- 5) Market condition.

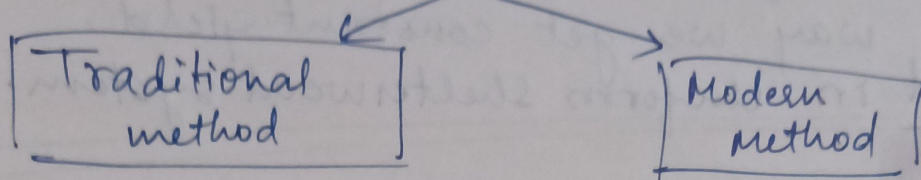
Steps involved.

- 1) Identify harvestable area
- 2) Prioritize harvestable area.
- 3) Develop harvest schedule.
- 4) Plan harvesting operation.
- 5) Implement harvest plan.



Ans (c)

## Various method of forest cover monitoring



1. Manual ~~see~~ estimation of forest

2. Observation by Dakota aircraft, Baloon

1. Satellite like ResourceSat-II

2. LIDAR

3. Microwave Remote Sensing.

### 1. Manual estimation

\* Staff goes to forest to estimate forest cover.

\* Issues

↳ limited coverage

↳ slow

↳ ~~exp~~ lot of staff needed.

### 2. By Baloon, Dakota aircraft

\* black & white photograph.

\* Aircraft is expensive.

### 3. Satellite like ResourceSat-II

\* 1:50,000 scale.

\* can tell green vegetation cover.

\* Issues

↳ Plant with less chlorophyll are not green

↳ counts plantation of Sugarcane as forest

↳ cloud cover.



#### 4. > LIDAR

- ↳ uses laser technology
- ↳ ~~deep~~ Tells about tree structure.
- ↳ But can't be done on mass scale.

ISFR-2021 used ResourceSat-II satellite with  $375 \times 375$  m resolution to monitor forest cover.

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#### Ans (d)

Working Plan is systematic plans that ~~works~~ tells about continuity of Policy and controlled forest treatment in State owned forest

↳ ~~But working plan has 10 year schedule,~~  
~~as per working plan code (2014).~~

Working Scheme is annual plan, which ~~acts as sub-part of wo~~

\* It is similar to working plan, but is used for—

- Forest on private land
- Forest on non-Government land
- Small area management like forest in municipal ground, village, etc.



## Need for working Scheme

1) As per Godavarman case (1998) of Supreme court, no forest can be managed without working plan/scheme.

2) Forest Policy (1988) also provides need for working scheme.

3) Tells about

- ↳ controlled forest treatment
- ↳ Attainment of objectives
- ↳ Data on forest inventory
- ↳ Data on forest composition and structure.

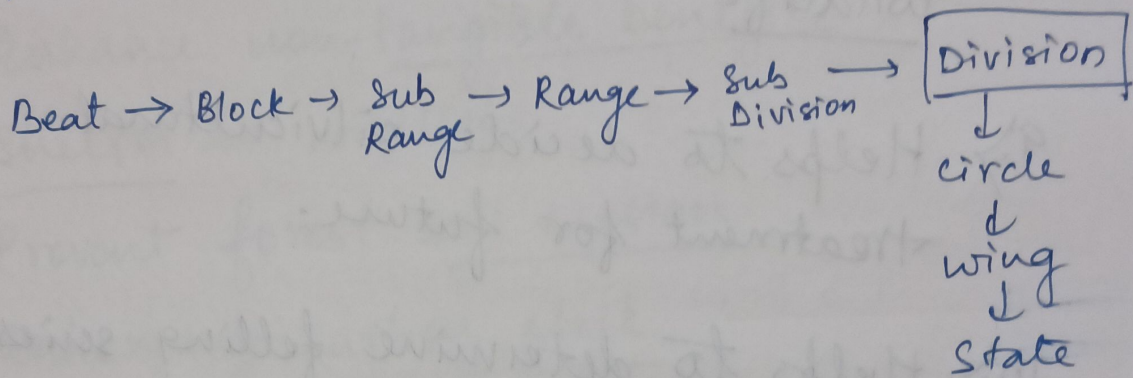
Hence working scheme allows for systematic and planned management of forest that is outside government land.



Ans. (e)

Working plan is written scheme of management, that tell about continuity of forest policy and planned silvicultural treatment.

Division is territorial classification of forest administration, headed by DFO.



How divisional working plan is helpful

- 1) Gives DFO discretion to plan forest management
- 2) Tells about impact of silvicultural treatment
- 3) Helps to decide silvicultural system based on tree, site quality, site factor.
- 4) Includes stock of forest inventory.
- 5) Mentions past silvicultural treatment.



6. → Easy to create regeneration map and stock map at divisional level.
7. → Easy to ~~can~~ divide forest into Range → compartment → sub-compartment in divisional level.
8. → Tell about carrying capacity of wildlife.
9. → Helps to decide silvicultural treatment for future. ✓
10. → Helps to determine felling series based on local conditions.



Ans 2 (a)

Forest management is use of scientific, technical and economic principles to attain desired objective of forest without compromising site quality.

### Objectives

1. > Enhance non-tangible benefits
2. > Shelter to wildlife
3. > Prevent forest soil erosion.
4. > enhancing carbon stock
5. > enhancing CAI (Current annual increment) and MAI (Mean annual increment).
6. > Countering climate change  
→ India's INDC includes 2.5-3 bn tonnes of CO<sub>2</sub>.
7. > Getting sustainable yield of timber for forest
8. > Development of NTFP industry.
9. > Livelihood to forest dwellers.
10. > Development of JFM



11.7 Regulation of yield.

12.7 Enhancing quality of stock.

## Peculiarities of forest management

1.7 Land

↳ large area

↳ inaccessible terrain

2.7 Soil

↳ Poor productivity

↳ erratic rainfall.

3.7 Climatic condition

↳ Large diversity in forest types

• Chamfron & Seth (1968) classified 15 types of forest.

4.7 Biotic pressure

↳ Animal grazing and trampling

↳ Pest & insect attack

↳ Human exploitation of forest.



## 5. Legal

↳ Karnataka Preservation of trees Act

↓  
lot of permission needed for tree felling

↳ J&K HC stopped felling of ~~20~~ 20-mm Russian poplar.

## 6. Social

↳ Resistance from forest dwellers & social activities in forest management.

## 7. Funding

↳ Poor private participation due to long rotation term.

## 8. State management of forest

↳ less accountability

↳ Poor R&D

Hence forest management is peculiar.

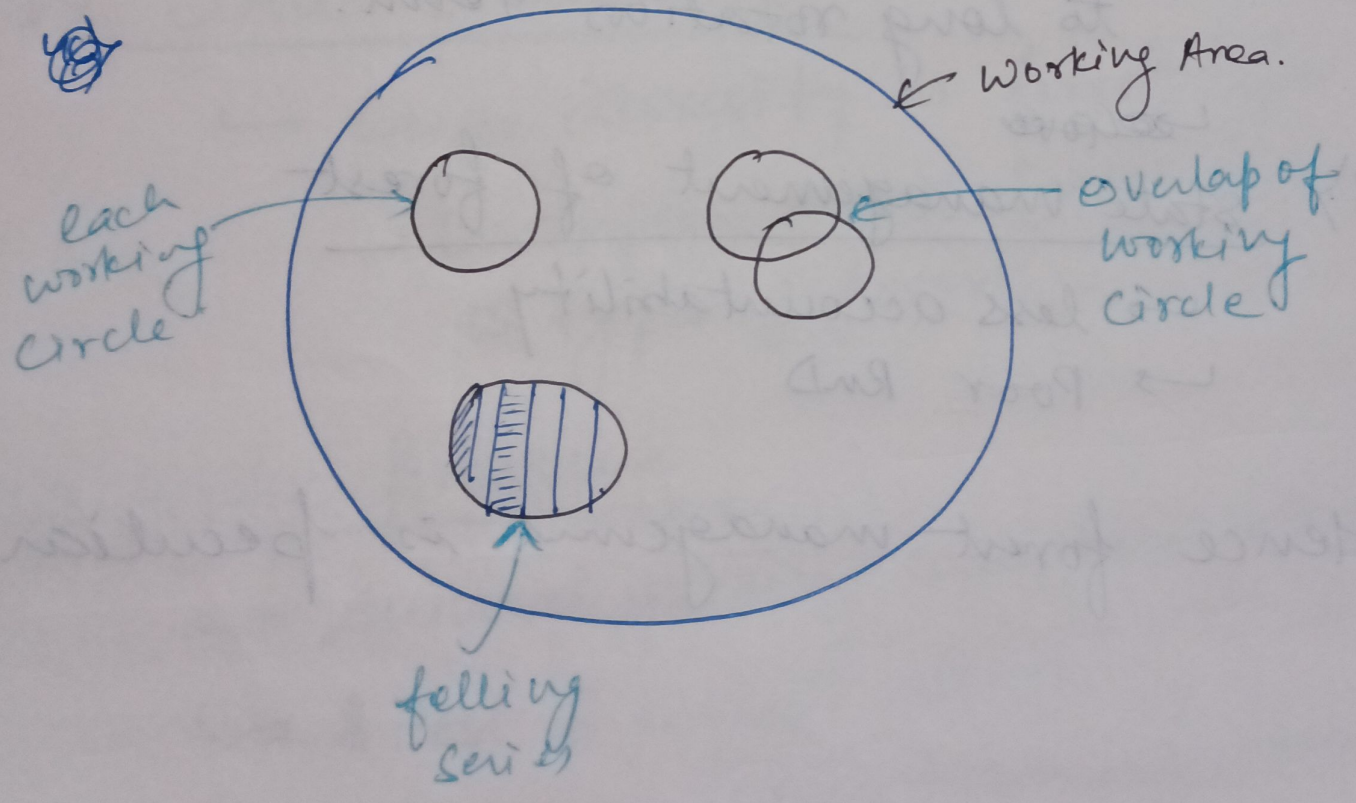


Ans 2 (b)

Working circle is a silvicultural unit of forest, that has common working plan, silvicultural operation, etc.

Features

- 1) It is largest classification, under silvicultural treatment
- 2) It is subdivided into ~~periods~~ felling series; annual coupes; felling section.
- 3) Working section can overlap





# Types.

1. JFM working circle
- ~~2. Wildlife working circle.~~
2. Wildlife management working circle
3. Improvement felling working circle
4. Enrichment plantation working circle
5. Clear felling working circle
6. Shelter wood working circle.



Ans 2(c)

Rotation is time gap between regeneration and final felling.

eg. Sal has rotation age of 80-140 years.

Physical Rotation

Maximum Volume Production Rotation

- |   |  |
|---|--|
| <p>① It is age upto which-</p> <ul style="list-style-type: none"><li>→ tree remains sound</li><li>→ can produce viable seed</li></ul> | <p>② Age upto which</p> <ul style="list-style-type: none"><li>→ Tree produce maximum volume of output</li><li>→ eg. Wood Pulp.</li></ul> |
| <p>② For roadside plantation, recreational plantation</p>   | <p>② For commercial plantation like <u>eucalyptus</u>, <u>Poplar</u>.</p>  |
| <p>③ At end of physical rotation tree begins to die</p>   | <p>③ At its end, CAI begins to decline.</p>  |
| <p>④ It is difficult to predict</p>   | <p>④ It is generally easy to predict.</p>  |

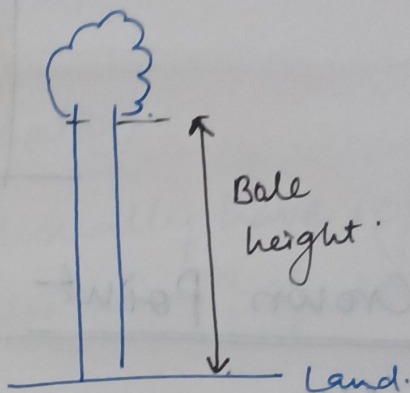


Ans. 5

Ans (a)

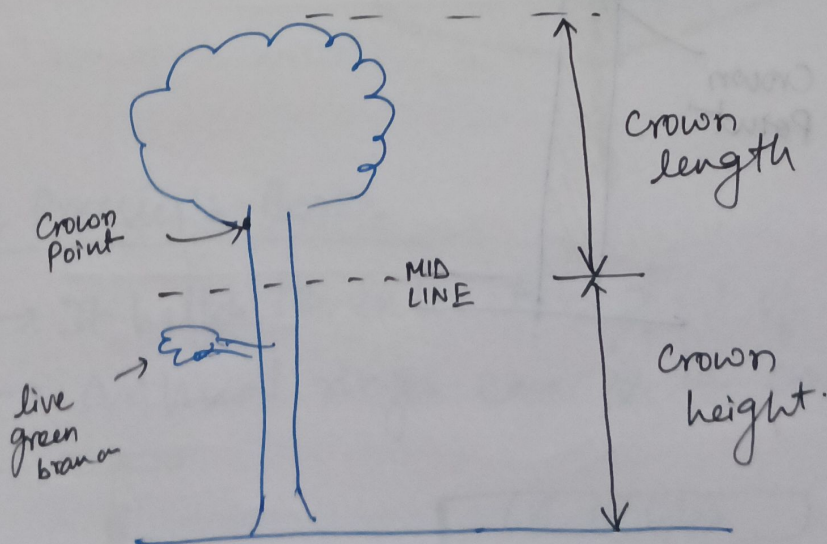
(a) Bole height

- \* Bole is woody stem of timber, which is usually straight
- \* Bole height shows height of bole that ~~is~~ can be utilised.



(b) Crown length

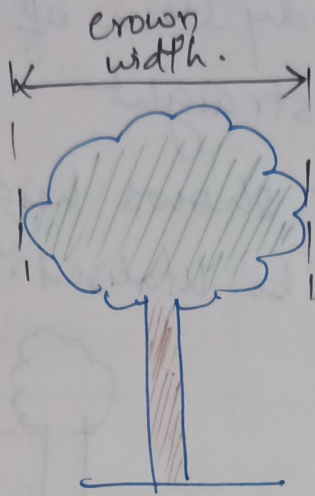
- \* It is height of top-most point of crown, ~~to~~ from mid-point between crown point and live green branch and live green branch.





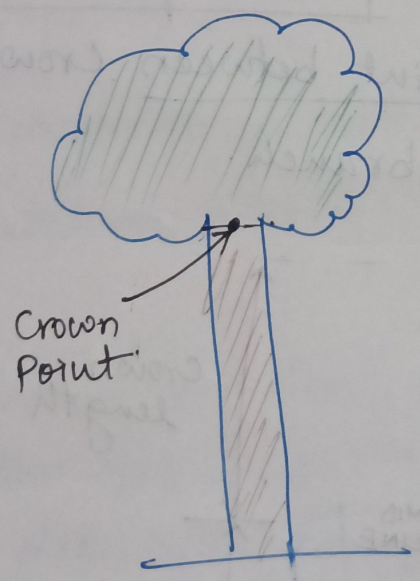
(iii-) Crown width.

It is total width of crown, when both extreme ends of crown are included.



(iv-) Crown Point

\* It is lowest point of crown, from where it starts from bole.





Ans (b)

For a standing tree, it can't be cut to count annual rings.

So various methods are—

1) By ocular method.

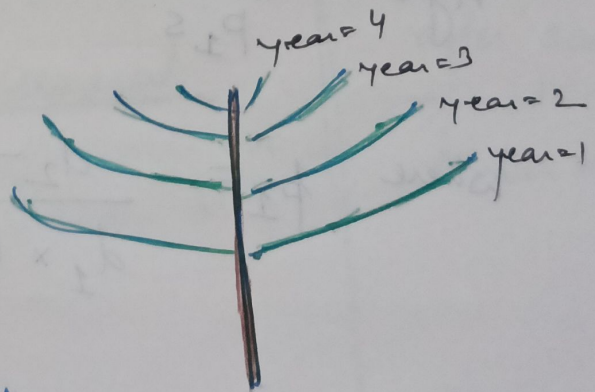
↳ expert can tell age based on experience

2) By plantation information

↳ Plantation sites usually have information like year of plantation, species, etc.

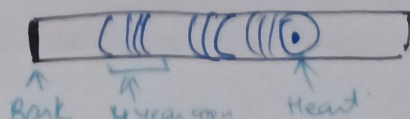
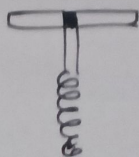
3) By counting annual shoots

↳ conifers usually produce new shoot every year.



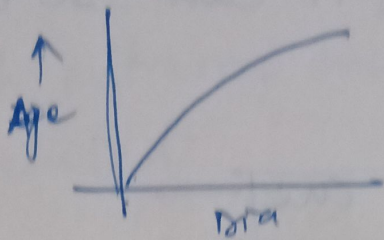
4) By Pressler's Borer

↳ It helps to extract a part of stem  
↳ annual rings can ~~be~~ be counted.





5) By Age-diameter curve.



\* by measuring diameter, age can be calculated

6) By periodic measurement

↳ when annual rings are not visible

↳ ~~3 Annual rings~~

↳ 3 periodic measurements are taken

1<sup>st</sup> →  $d_1$  diameter }  $p_1$  value  
2<sup>nd</sup> →  $d_2$  diameter }  $p_2$  value  
3<sup>rd</sup> →  $d_3$  diameter }

$$\text{Age} = \frac{1}{p_1 s}$$

where  $p_1 = \frac{d_2 - d_1}{d_1 \times (\text{time difference})}$

$$s = \frac{\log p_1 - \log p_2}{\log d_2 - \log d_1}$$



Ans (c)

Volumetric table shows volume of tree, based on its species, d.b.h, height.

## TYPES

Based on number of variable

- 1) One variable
  - ↳ only d.b.h
  - ↳ gives local area values.
- 2) Two variable
  - ↳ D.b.h ; height
  - ↳ applicable to regional area.
- 3) Three variable
  - ↳ Also includes thinning types.
  - ↳ NOT used in India

Based on area of scope

- 1) Local area
  - ↳ based on one variable
- 2) Regional area
  - ↳ based on two variable
  - ↳ applicable for area larger than local
- 3) General
  - ↳ applicable for broader area

Based on utility

- 1) Commercial
  - ↳ Tells volume of timber for a specific industry
- 2) Sawn-out.
  - ↳ Tells volume of timber obtained after sawing operation in timber mill.



Ans(d.)

## ~~Use of remote~~

Remote sensing is ~~use of~~ extraction of information from some object without actual/physical contact  
eg → Satellite survey.

### Use in forest management

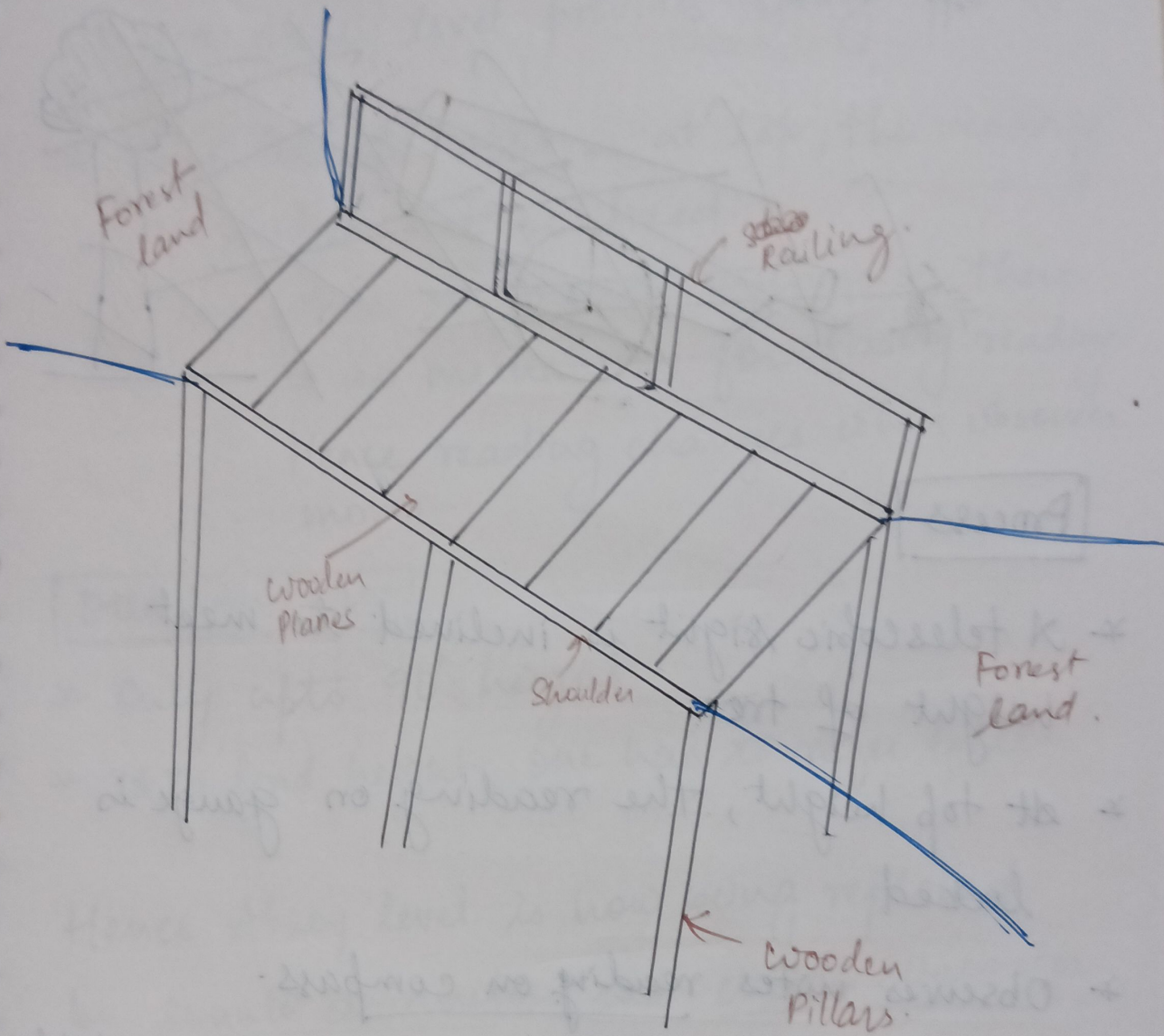
1. → Estimation of forest stock
2. → Estimate growth, increase of forest cover
3. → Monitoring forest fire  
↳ eg. FAST 3.0 uses SNPP-VIIS sensor.
4. → Monitoring invasive species  
↳ Hyper spectral sensor can distinguish between plant and invasive species
5. → Monitoring forest boundaries
6. → Detection of encroachment
7. → Comparing effect of silvicultural treatment

ISFR-2021 used ResourceSat-III remote sensing satellite to present its data.



Qns (e)

Wooden bridge is a passage constructed in forest, with wood as primary component.



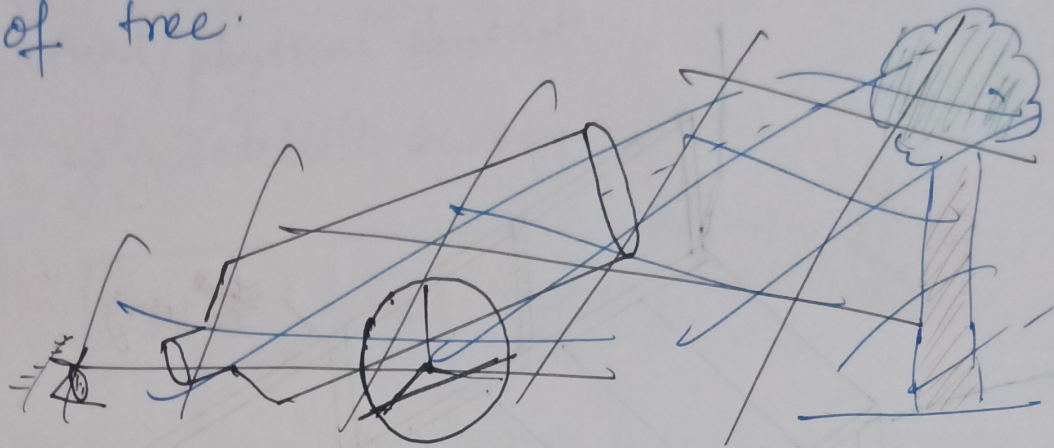
### Threats

- ↳ Rotting of wood due to water
- ↳ Termite attack
- ↳ Overload
- ↳ Flood water.



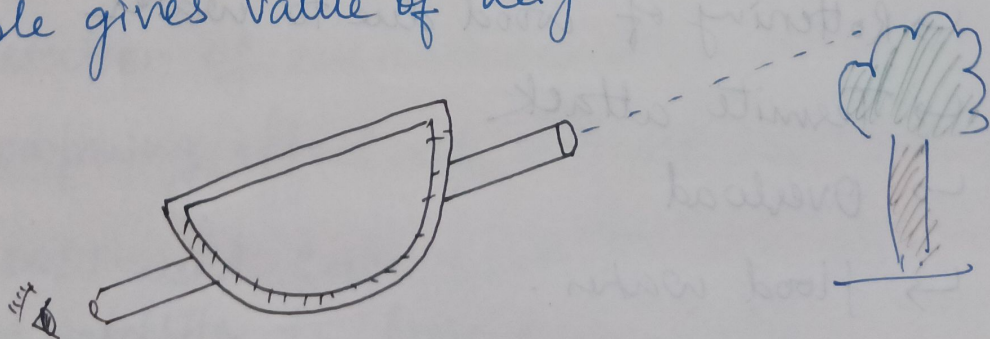
Ans 6(a)

Abney level is modification of Brandis thesometer to measure height of tree.



### Process

- \* A telescopic sight is inclined to meet height of tree
- \* At top height, the reading on gauge is locked
- \* Observer notes reading on compass.
- \* This angle reading is put to Brandis table
- \* Table gives value of height





## Advantage

- \* While Brandis hypometer provides reading only upto  $60^\circ$ .
  - ↳ Abney level provides reading upto  $90^\circ$
- \* Once telescopic sight is at top, the reading on compass can be fixed.
  - ↳ while in Brandis hypometer, there is no mechanism for fixing reading. Hence reading changes when observer moves

## Disadvantages

- \* Only upto  $90^\circ$  height.
- \* ~~To~~ To find height, one has to refer table.

Hence Abney level is now being replaced by Sunnto clinometer and electric clinometer.



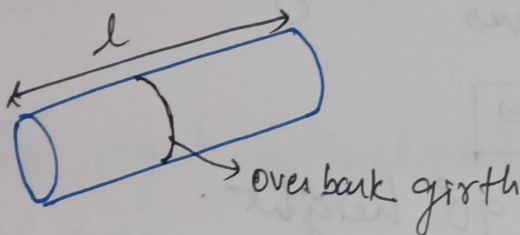
Ans 6.(b)

Quarter girth formula is used to tell volume of bark.

In Britain is it called "Hopper's rule".

Formula

$$V = \left(\frac{g}{4}\right)^2 \times l.$$



$g \rightarrow$  over bark girth.

$l \rightarrow$  length of section.

Why it is preferred

- \* It uses over bark girth which is easy to measure
- \* One 1 bark measurement is needed.
- \* It gives a fairly accurate of wood volume that can be obtained after ~~one~~ operation is sawing mill



~~This formula gives accur~~

- ↳ This is because this formula takes over bark,
- ↳ Volume obtained is 21% less than actual volume of wood
- ↳ But this ~~is~~ under-estimate compensates for loss of wood during sawing mill operation.

### Drawback

- ↳ While it is meant to provide volume of wood, the volume is 21% less than actual volume.
- ↳ Overbark girth reading can vary depending on section.



Ans 6(c)

Yield table is a tabular information that shows tree volume, d.b.h, total volume of wood obtained, minor wood obtained, ~~and~~ CAI, MAI, etc at end of various thinning cycle and during final felling.

### Preparation

1. → Dbh, height, volume of various trees is obtained
2. → sites are ~~calculated~~ classified as per site quality
3. → For each site quality various values of volume is obtained.
4. → Reading of 10-year is taken.
5. → This is then put in Yield table.



## Sample Yield Table

Measurement	First felling	2nd felling	Final felling	CAI, MAI
1) Volume	1) Total wood volume	1) Total wood vol.	1) Total wood	
2) Height	2) Main Wood volume	2) Main wood	2) Main vol.	
3) D.B.H	3) Minor wood volume	3) Minor wood	3) Minor wood volume	

## Role in forest management

- 1) Find total carbon stock
- 2) calculate increment of volume, etc.
- 3) Impact of silvicultural treatment.
- 4) Understanding structure of ~~tree~~ crop
- 5) Understanding composition of crop.

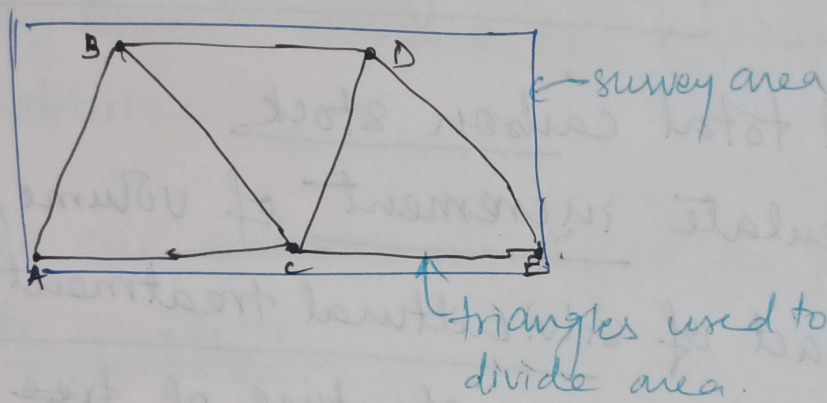


Ans 8 (a)

Chain survey is method of ground surveying with help of chain, tapes, rods, etc.

### Principle

- \* It is based on "Triangulation"
- \* whole area is divided into small triangles



### Advantages

1. Simple → even untrained staff can do.
2. Accurate
3. No sophisticated instrument needed.
4. Quick
5. Best for small area and levelled terrain.



## Disadvantage

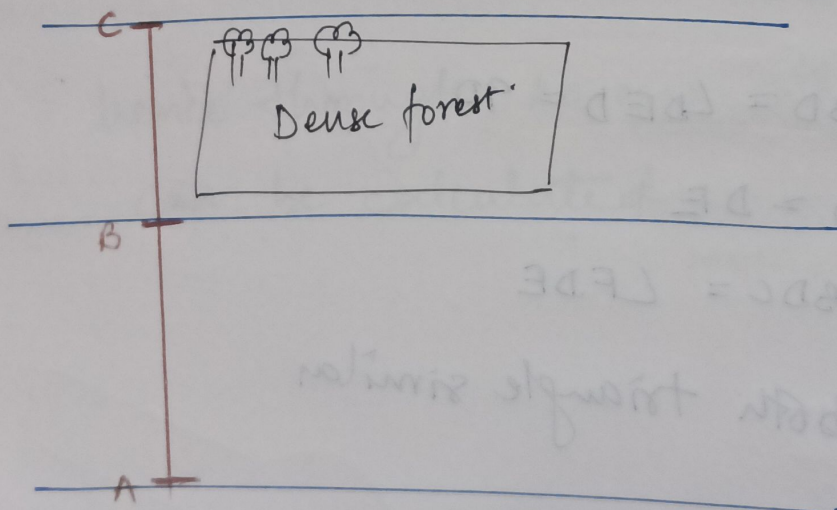
1.  $\rightarrow$  Applicable for levelled area only
2.  $\rightarrow$  For small area only.
3.  $\rightarrow$  Area must be able of dividing in triangle  
 $\hookrightarrow$  angle between  $30^\circ$  and  $120^\circ$

Dense forest interrupts chain line

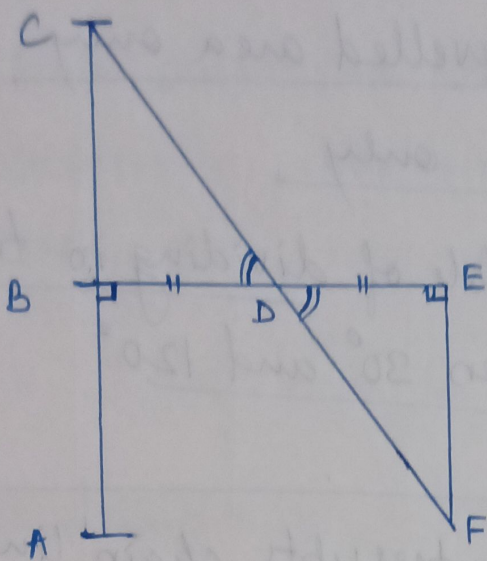
~~\* condition~~

Visibility possible  
but chaining not possible.

$\downarrow$   
length BC can't be measured.







\* We draw  $\perp^r$  to B as BE

\* Put midpoint D, so that  $DE = BD$ .

\* Draw  $\perp^r$  from E as EF.

\* Join F to C such that  $\angle FDE = \angle BDC$

$\therefore$  in  $\triangle BDC$  and  $\triangle DEF$

(i)  $\angle CBD = \angle FED = 90$

(ii)  $BD = DE$

(iii)  $\angle BDC = \angle FDE$

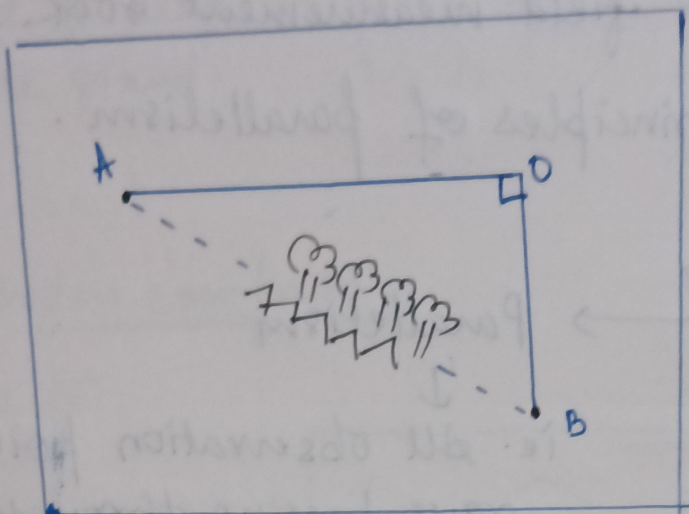
$\therefore$  both triangle similar

So  $CB = EF$

So ~~we~~ by calculating EF, we know CB.

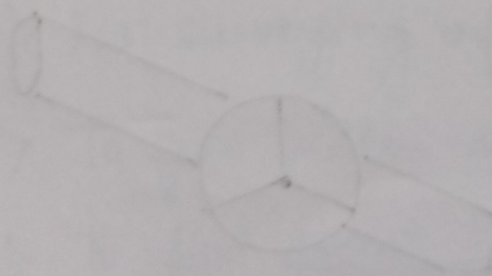


When visibility is ~~there~~ not there, but chaining is possible



- \* As AB can't be measured directly
- \* So we take offset at O. ( $\angle AOB = 90^\circ$ )
- \*  $AB^2 = AO^2 + OB^2$

Hence through AO and OB, length AB can be calculated.





Ans 8(b)

It is charting & presentation of an area using theodolite and table, without field measurement book, using principles of parallelism.

Principle → Parallelism

↓  
ie. All observation points have rays passing through total station.

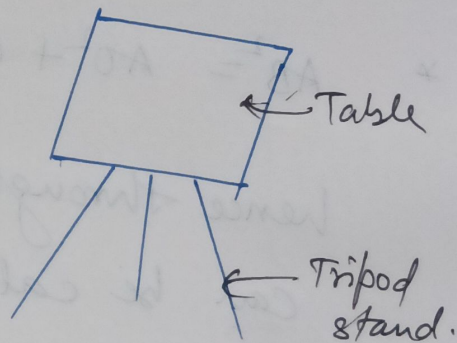
Tools

① Plane Table

↳ 60 x 75 cm

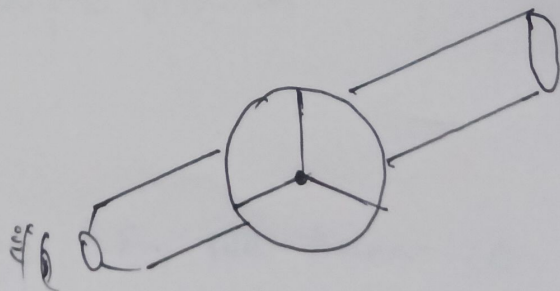
↳ It has stands

↳ Used to keep observation sheet



② Alidade

↳ used to measure angles.

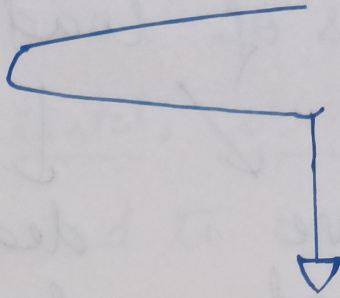




### 3.7) U-shape folk with Plump bob.

\* fixed at end of table

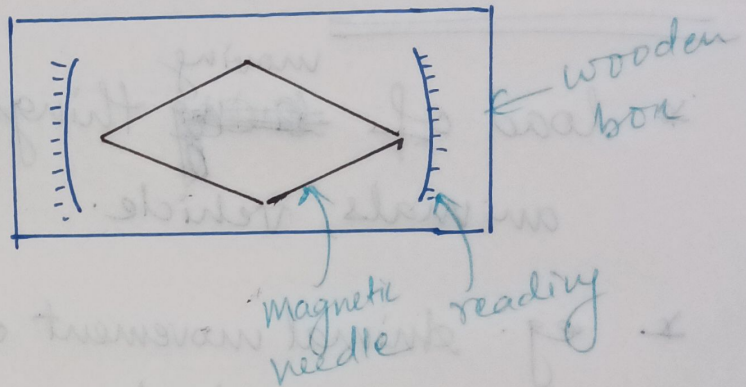
\* Used to keep table stand.



### 4.7) Wooden compass

\* Used to point table in North direction

\* Use to fix angle of table.



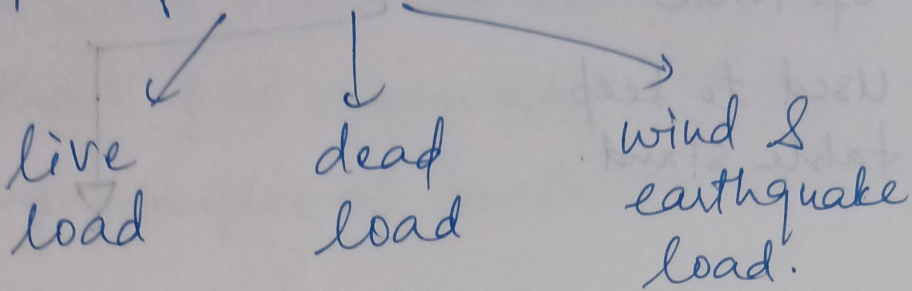
### Role in forest management

- 1.7) When we need quick result
- 2.7) When high accuracy is not needed.
- 3.7) For drawing straight fire lines.
- 4.7) For surveying of areas ~~with~~ with broken maps.
- 5.7) To find hidden areas like animal habitat
- 6.7) To find forest boundary.
- 7.7) When compass survey can't be done due to local attraction.



Ans 8(c)

In buildings there are various types of load



### Live load

\* load of ~~any~~<sup>moving</sup> things like humans, animals, vehicle.

\* eg. animal movement over wildlife overpass bridge at Tadoba-Andheri T.R.

### Dead load

\* load of bricks, ~~to~~ roof, etc.

\* this load is transmitted to foundation through columns.

### wind load

\* strong wind creates pressure.

\* More prominent in

- windy area
- hilly area
- tall structures



## earthquake load

\* can cause uneven settlement of building.

So adequate beam, lintel, columns and foundation is provided to carry these loads.