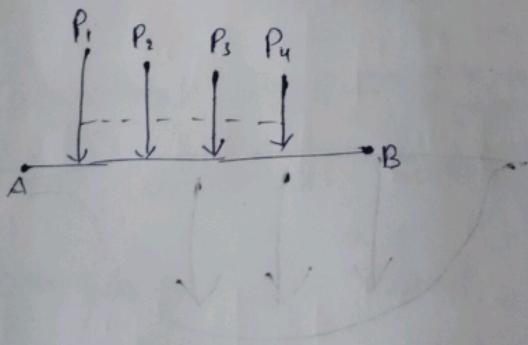


plane

- (3) It is connected by two points in a straight line
- (4) plane Surveying formed by triangle
- (5) In plane surveying the area is less than 195.5 sqm^2

(6) In plane Surveying we use for all engineering purpose

(7) The plumb lines should be parallel to each other and straight lines



geodetic

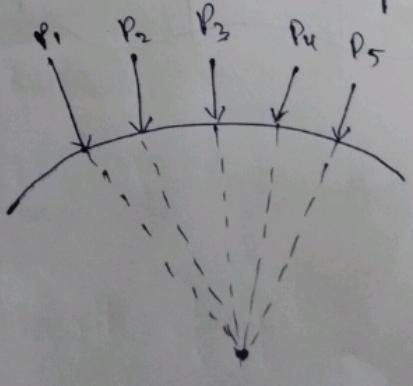
- (3) It is connected by two points in arc

(4) It is formed by spherical triangle

(5) In Geodetic Surveying the area is greater than 195.5 sqm^2

(6) In Geodetic Surveying it is used in Control points (or) establish the control point

(7) In Geodetic Surveying the Plumb lines meets the Centre of earth and it is not parallel



If $H \cdot \text{axis} > V \cdot \text{axis}$ than the shape of the earth is oblate spheroid.

If $V \cdot \text{axis} > H \cdot \text{axis}$ than the shape of the earth is prolate spheroid.

Classification of Surveying:-

- (1) Classification based on earth surface / earth curvature.
- (2) Classification based on object / purpose
- (3) Classification based on instrument.

Classification based on earth surface Surveying:-

(i) Plane Surveying

(ii) Geodetic Surveying

(iii) Plane Surveying:

(1) Plane Surveying is defined as ignoring the earth curvature.

(2) It is less accurate.

(ii) Geodetic Surveying:

(1) Considering the earth curvature

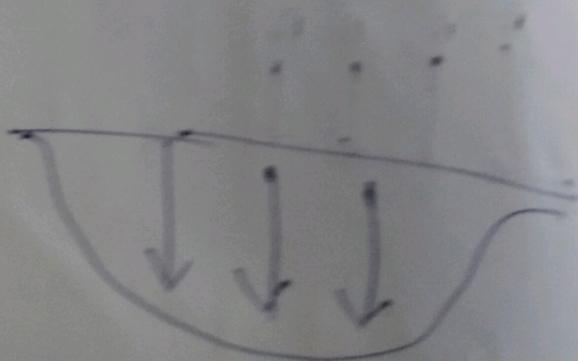
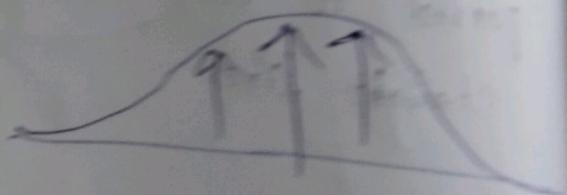
(2) It is high accurate

② Classification based on objects / purpose

- (i) Topographical Survey
- (ii) Engineering Survey
- (iii) Route Survey
- (iv) Hydrographic Survey
- (v) Astronomical Survey
- (vi) Cadastral Survey
- (vii) Miners Survey
- (viii) Geographical Survey

Topographical Survey :-

- (1) It shows the variations in the elevation.
- (2) It shows the features like ~~rivers~~, hills, mountains and valleys.
- (3) It gives the Topographical maps.



Engineering Survey:-

- (1) It ~~finding~~ shows Roads, buildings and dams
- (2) It is ~~shearing~~ used for Engineering purpose

Route Survey:- ***

- (1) It shows Routes like highways, railways and ~~Sewer~~ lines.

Hydrographic Survey:-

- (1) Survey conducting the water bodies
- (2) It is determine the discharges, seashores depth of water bodies

Astronomical Survey:-

- (1) In this Survey we find out latitude and longitude of a location.
- (2) To determine the exact position of point.

Cadastral Survey:- ***

- (1) The Cadastral Survey is used to fix the boundaries of a land
- (2) It is also find the boundaries of a land

(3) It is also known as Mineral Survey
Mines Survey:

(4) It is the survey of determining the mineral exploration.

Geological Survey:

(5) It is used to determine the depth of soil strata.

Classification Based on Instrument

(1) Chain Surveying:

o To determine the horizontal distance.

(2) Compass Surveying:

o To find out the bearings.

(3) Leveling Surveying:

o To determine the elevations.

(4) Theodolite Instrument:

o To determine the horizontal angles and vertical angles.

Survey.

⑤ Tacheometre:-

(i) It is determine the horizontal distance and elevations [vertical distance].

⑥ photogrammetry:-

(i) To measure from photos [distance], height [and area] to reduce instrument error.

⑦ plane tables:-

(i) To find out the plotting in the field.

⑧ GPS [global position system]:-

(i) To determine the location.

⑨ GIS [global information system]:-

(i) To find out the maps.

⑩ EDM [electronic distance measurement]:-

(i) To find out the long distances.

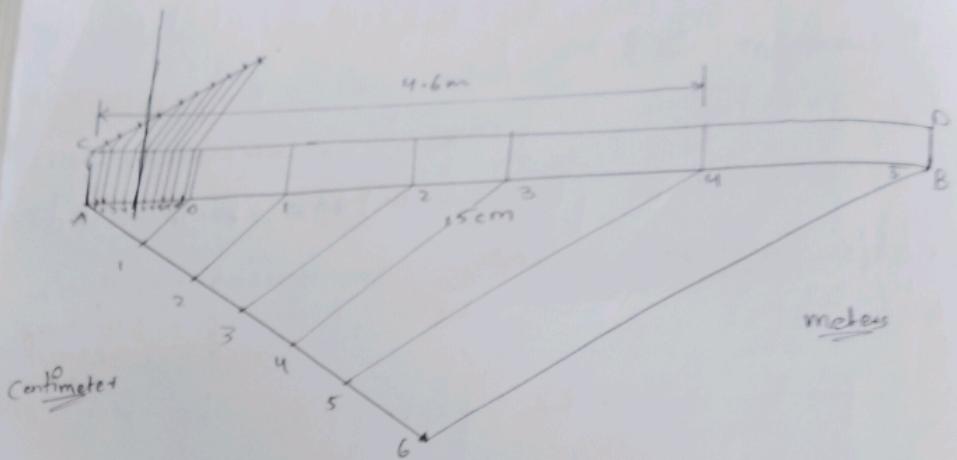
⑪ Total station:-

(i) It is used for
To measure all types of measurement.

*Principle of surveying:-

- (1) Working from whole to part. [to minimize the errors]
- (2) Each point is established with reference to measurements.
- (3) Redundancy measurement

Each measurement taken number of multiple times



phases of Surveying:-

- ① map Survey
- ② Reconnaissance Survey
- ③ preliminary Survey
- ④ location Survey
- ⑤ Construction Survey

Map Survey:-

It is showing that in all maps in our country

Reconnaissance Survey:-

The purpose of Reconnaissance survey is to compa

alternative and eliminate those routes which are not practical (or) unfeasible and to identify more promising routes and areas.

Preliminary Survey:-

The objective of preliminary Survey is to collect and data to prepare a plan (or) map for the route which will be further be used for planning and designing.

Location Survey:-

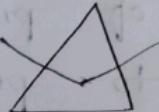
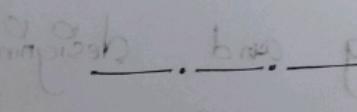
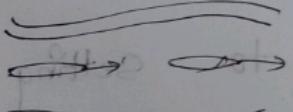
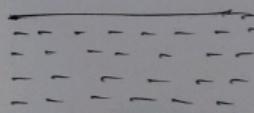
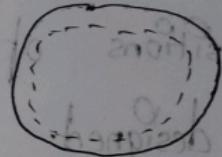
It help's to setting out work on the ground for the actual construction of the route.

Construction Survey:-

It is setting out the project use to make the desired positions of routes that the engineer has designed.

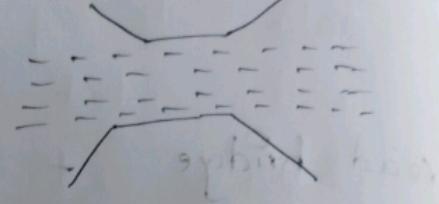
Conventional Signals / Signs In Surveying:-

It is represents the combination of dots, lines, colours and Alphabates. It is used for features like cities, roads and railways.

and	Name	conventional signals/sign
1.	North line marker - position	
2.	main stations) - providing triangulations	
3.	chain line	
4.	River	
5.	Canal	
6.	lake/pound	
7.	open well	
8.	tube well	
9.	foot	
10.	rail	
11.	rail	
12.	ve	
13.		
14.		
15.		
16.		
17.		

- s/sign
- 9. foot path - |
 - 10. railway - single lane - + + + + +
 - 11. railway - Double lane - |||
 - 12. road bridge - |||
 - 13. metal road - - - - -
 - 14. graveyard
 - 15. church
 - 16. Temple
 - 17. post-office
- PO

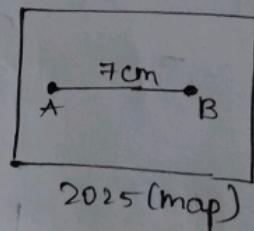
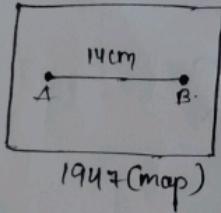
18. police station - PS
19. rest house - RH
20. level crossing - II
21. foot path with bridge - I



Shrinkage of map:-

It is defined as change in volume of map

Ex:-



Shrinkage factor:-

Shrinkage factor equals to measure distance from map By Actual distance

$$\text{Shrinkage factor} = \frac{\text{M.D from map}}{\text{Actual distance}} = \frac{7\text{cm}}{14\text{km}} = 0.5\text{km}$$

$$\text{Actual distance} = \frac{\text{M.D of map}}{\text{Shrinkage factor}}$$

Problem:-

A line which was plotted to 10cm, now measured as 8cm. If the distance measured between two points in a map is 80km what is the True distance (or) Actual distance between the points

Sol

$$\text{True distance} = \frac{\text{M.D from map}}{\text{S.F}}$$

$$\text{S.F} = \frac{\text{M.D from map}}{\text{Actual distance}} = \frac{8}{10} = 0.8$$

$$\text{T.D} = \frac{80}{0.8} \times \frac{10}{10} = \frac{800}{80} = 100\text{km}$$

II part

methods of finding distances

① Direct method.

② Approximate method.

Direct method

① chain Surveying:-

In chain Surveying to measure horizontal dista

The principle of chain surveying is Triangulation

Instruments for chain surveying:-

- ① chain (or) Tape
- ② pegs
- ③ Arrows
- ④ Hanging rods
- ⑤ offset rods
- ⑥ Cross staff (or) optical square, Prism square
- ⑦ Clinometer
- ⑧ plumb bob

chain (or) Tape :-

- ① Chain is used to measure the distances.
- ② chain is made up of links
- ③ The material used in a chain is galvanized mild steel.

Classification of chain :-

- ① metric chain

- ② Engene
- ③ Gunter
- ④ Revenue

Metric

1) It

Engen-

1) It

Gunter

It

Rev-

It

Note

(1) Enginner's chain

(2) Gunter's chain (or) Surveyor's chain.

(3) Revenue chain

Metric chain:-

1) It is available in metres.

2) The metric chain is available in 10m, 20m, 30m.

Enginner's chain:-

1) It is available in feet.

Gunter's chain (or) Surveyor's chain:-

It is available in feet.

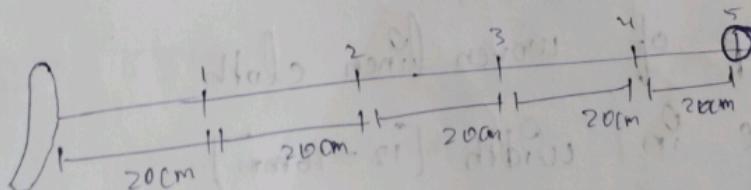
Revenue chain:-

It is available in feet.

Note :- 1) In metric chain $20m = 100$ links

$30m$ chain = 150 links

$$1 \text{ link} = 20\text{cm}$$



$$2) 1m \text{ chain} = 1 \text{ Brasing}$$

Each sm chain = 1 f alley

3) In Engineer's chain 100feet long = 100 links

$$1 \text{ feet} = 1 \text{ Link}$$

$$1 \text{ Link} = 20 \text{ cm}$$

$$1 \text{ feet} = 30.48 \text{ cm}$$

$$1 \text{ feet} = 12 \text{ inches}$$

$$1 \text{ inch} = 2.54 \text{ cm}$$

4) Counter's chain (or) Surveyor's chain

$$66 \text{ feet} = 100 \text{ links}$$

$$1 \text{ link} = 0.66 \text{ feet}$$

5) Revenue chain

$$33 \text{ feet} = 16 \text{ links}$$

$$1 \text{ link} = 2.065 \text{ feet}$$

Types of Tapes :-

① Cloth Tape:-

→ It is made up of woven linen cloth.

→ It is available in width [12-16 mm]

Disadvantages:-

① shrinkage.

② stretching.

③ Metallic Tape:-

→ It is the combination of woven linen cloth + metal wire.

Disadvantages:-

① stretching ability will be decreases.

③ Steel Tape:-

→ It is not subjected to shrinkage and stretching.

→ The coefficient thermal expansion is high.

→ It is not given accurate results.

Disadvantages:-

① It is not used in the surveying because it has very high coefficient of thermal expansion.

④ Invar Tape:-

→ It is the combination of steel + Nickel
[64%] [36%]

→ It is not subjected to shrinkage and stretching.

→ The coefficient of Thermal expansion of tape = 0.

→ It gives accurate results.

(2) Pegs:-

→ It is available in wood

→ It is used to mark the stations on the ground

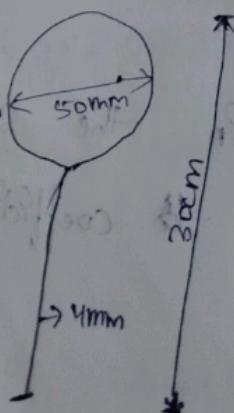
(3) Arrows:-

→ It is made up of hard steel.

→ The diameter of the Arrow is 4mm

→ It is used to mark the end of the chain

→ One person can carries 10 arrows



(4) Ranging rod

→ It is

→ The length

*** The dia

→ Each co

(5) Offset

→ It is

given

(6) Cross

*** The

Types

(1) op

(2) f

(3) +

④ Ranging rods:-

- It is used for ranging lines of survey.
- The length of ranging rod is 2-3m
- ** The diameter of ranging rod is 2.5cm



→ Each colour represents 20cm height (or) length.

⑤ offset rods:-

- It is similar to the ranging rod But offsets are given

⑥ Cross staff:-

- ** The length of the cross staff is 3m

Types of cross staff

① open cross staff

② french cross staff

③ Adjustable cross staff

Cross stuff

(6) French cross stuff

- it is consist of four openings and it is establish in 45° , 90° and 135°

ext 45° , 90° , 135° , 180° , 225°



3 stuffs are used parallel to the vertical line

(7) Adjustable cross stuff:-

- it is used for any angle

(8) clinometer:-

- it is the instrument used for finding the angle of slope

(9) plumb bobs:-

- it is used for exactly centre on the ground

Types of correction in chain Surveying :-

① Correction for Standardization:-

- It is always positive or negative.
- $C_{\text{stand}} = \text{True distance} - \text{measuring distance}$.

$$C_{\text{stand}} = L - l'$$

$$L = l' \times \frac{l'}{l}$$

L = True length of chain
 l' = distance measured

l' = measured distance

l = incorrect length of chain

l = True length of chain

$$C_{\text{stand}} = l' \times \frac{l'}{l} - l'$$

$$C_{\text{stand}} = l' \left[\frac{l'}{l} - 1 \right]$$

Note :- 1) If $l' > l \Rightarrow$ To long condition

2) If $l' < l \Rightarrow$ To short condition

Problem:-
A 30m chain is too long by 0.5m. If distance measured between two points A and B is 500m, what is a true distance between them?

Given

$$L = L' \times \frac{l'}{l}$$

$$l' = 30 + 0.5 = 30.5\text{m}$$

$$l = 30\text{m}$$

$$l' = 500\text{m}$$

$$L = ?$$

$$L = 500 \times \frac{30.5}{30}$$

$$L = 500 \times 1.01$$

$$\boxed{L = 508.32}$$

(1) correction is positive because it has to long condition

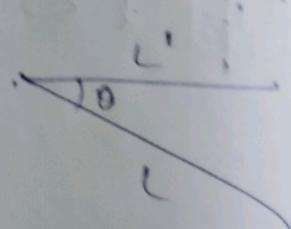
(2) correction is negative because it has to short condition

(2) correction for slope (Cs) :- It is always negative

$$Cslope = l - l'$$

$$\cos\theta = \frac{L}{l'}$$

$$L = l' \cos\theta$$



by 0.5m. If the points A and B are at equal distances from the vertical baseline.

$$0+0.5 = 30.5 \text{ m}$$

30m

30m

?

?

to long

ass to short

vary's negative

15

15

15

15

15

$$\text{Cslope} = L' \cos\theta - L' \sin\theta$$

$$[\text{Cslope} = L' (\cos\theta - 1)]$$

$$[\text{Cslope} = \frac{-h^2}{2L}]$$

h = Difference in elevations

L' = Distance on slope

θ = angle of slope

D = horizontal distance

Problems:-

- * In chain Surveying conducted, chain is 30m length, if its lower end is 2m low when place between A and B what is the horizontal distance between A and C?

$$\text{Sol} \quad \text{Cslope} = \frac{-h^2}{2L}$$

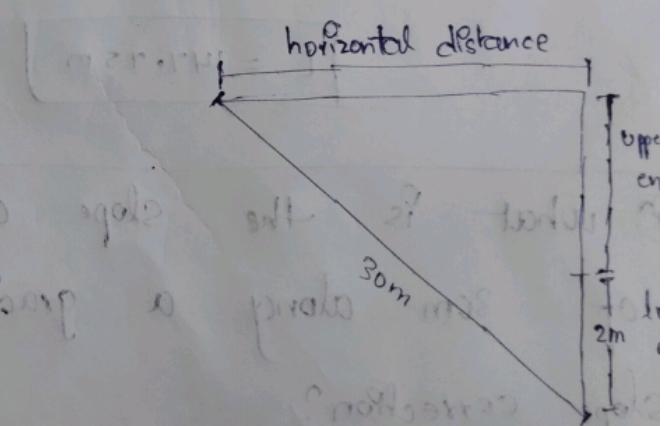
$$= \frac{-2^2}{2 \times 30}$$

$$= \pm 0.25$$

$$H \cdot D = L - \text{Cslope}$$

$$= 30 - 0.25$$

$$= 29.75 \text{ m}$$



④ Direct methods and explain chain, Tapes, ranging, and cross staff.

⑤ In chain survey conducted, chain is too short by 0.3m. When it's true length is 20m what is the measure between two points A and B if the distance between points A and B is 150m. True distance between points A and B is —?

$$\text{Sol} \quad L = l' \times \left(\frac{l'}{l} \right)$$

$\therefore L = 150 \times \left(\frac{150}{150 - 0.3} \right) \text{ m.}$

$\therefore L = 150 \times \left(\frac{150}{149.7} \right) \text{ m.}$

$$L = 150 \times \left[20 - 0.3 \right] \text{ m.}$$

$$\therefore L = 147.75 \text{ m}$$

⑥ What is the slope correction for a length of 30m along a gradient of 1 in 20?

Slope correction?

Sol

$$C_{\text{slope}} = \frac{-h^2}{2L} = -\frac{(0.05)^2}{2 \times 30}$$

$$= -0.075m$$