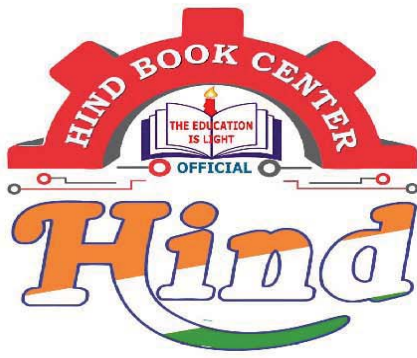




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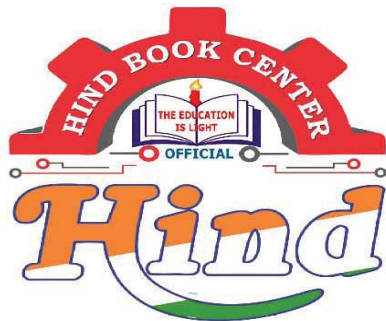
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* SURVEYING *

- BY ASHISH KUMAR SIR

ESE $\left\{ \begin{array}{l} \rightarrow \text{Prelims :- 28 Marks.} \\ \rightarrow \text{Mains :- 65 Marks.} \end{array} \right.$

GATE $\approx$ 6 Marks.

* Syllabus :-

chap 1-4 $\rightarrow$ Horizontal
5-8 $\rightarrow$ vertical.

1> Introduction.

2> linear measurement & chain survey.

* 3> compass survey

* 4> Traverse survey

* 5> levelling Work

chap.
1-11 $\rightarrow$ 98% syllabus

6> contours & Area-Volume

Extra $\rightarrow$ 2%.

7> Trigonometrical levelling

8> Tacheometry

* Extra : .

9> Curves. (data est.) other are
data collection

i> plane table Survey.

10> Accuracy & Errors.

ii> Triangulation

* * 11> photogrammetry (advance
survey)

iii> GPS / GIS / Remote
sensing / Time concept.

* $\rightarrow$ GATE

All $\rightarrow$ ESE

* Instruments

chapter 1 :- Introduction

- Survey is the art of determining the relative positions of point on, above or beneath the earth surface. through direct or indirect measurement of distance, direction & elevation.
- It also includes establishment of points to the ground which are predetermined to paper.

** Classification of Survey :-

- 1) LAND Survey :- Survey on surface of earth.
 - a) topographical Survey :- to know about general topography of area such as river, pond, valley, building, rails, roads etc.
 - b) cadastral Survey :- to know about property lines. such as state boundary, district boundary, Municipal boundary etc.
 - c) city Survey :- to provide any services to a city such as water supply, roads, rails etc.

2] Hydrographic Survey :- to know about underwater features.

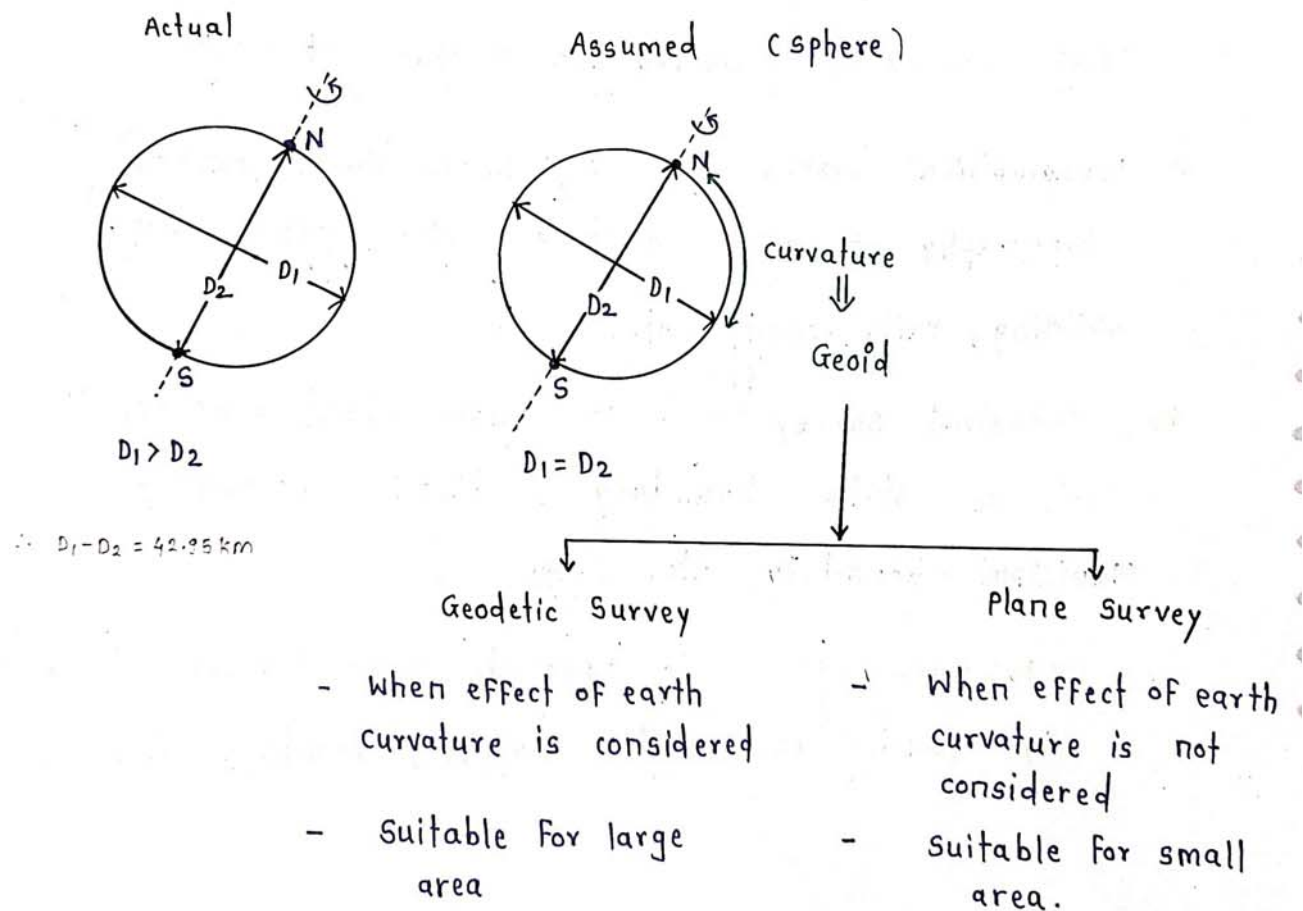
3] Astronomical Survey :- to know about position of stars, planet, moon, sun etc.

* Note :- to know about antique substance.

[Archeological Survey] yielded

ASI → India
↓ survey of
Archea

* Earth

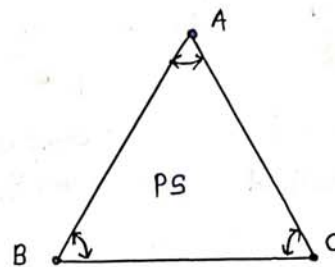
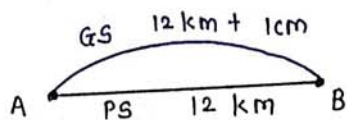


* observations :-

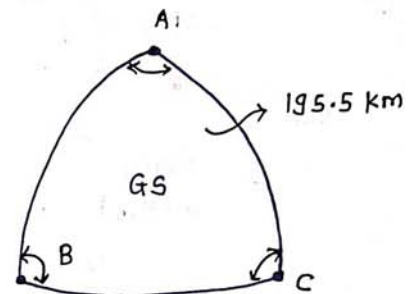
* Note :- i) Generally Geodetic Survey is considered for an area more than 250 km^2 .

2) observations :-

- i) For a distance measurement of 12 km in plane Survey geodetic distance will be just 1 cm extra
- ii) For a triangle of size 195.5 km^2 in geodetic Survey sum of internal angle will be just 1 sec. extra



$$\angle A + \angle B + \angle C = 180^\circ$$



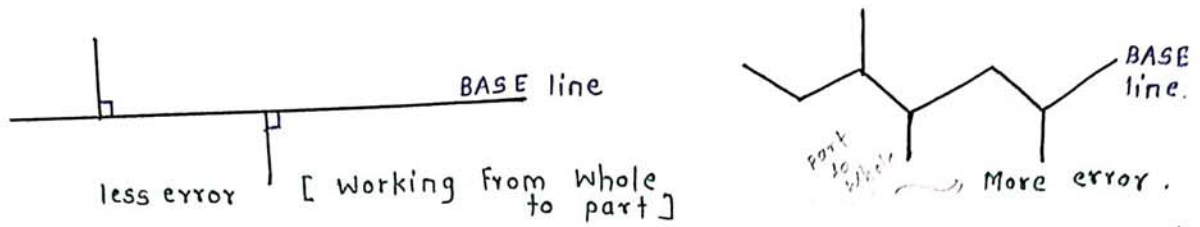
$$\angle A + \angle B + \angle C = 180^\circ 0' 1''$$

** Principles of Surveying :-

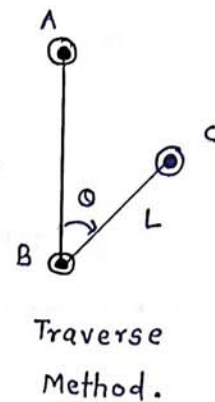
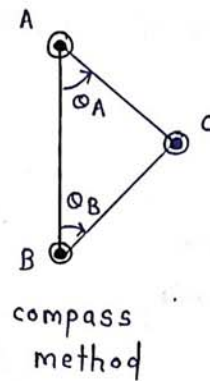
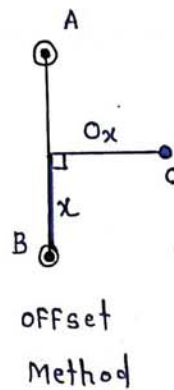
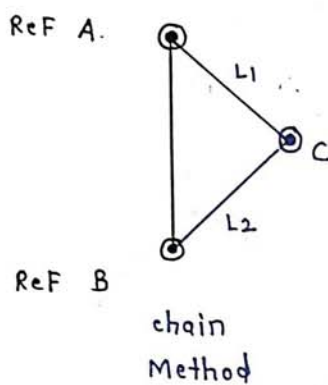
i) Working From Whole to a part :-
larger measurement smaller

- According to this principle larger measurements are taken first with high degree of precision. & then smaller measurements are taken even with lower degree of precision.

- In this way errors of small measurements will not appear to a larger measurements.



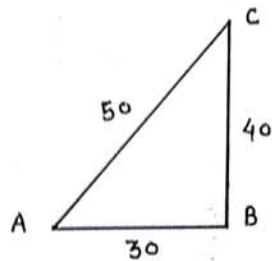
- 2) location of a point w.r.t. minimum two reference points:



3 chain survey.

A] Linear Measurement :-

- linear measurement taken to horizontal plane is called distance.
- linear measurement taken to vertical plane is called elevation.



distance	Elevation
$AB = 30$	$C \text{ w.r.t } B = 40$
$BC = 0$	$C \text{ w.r.t } A = 40$
$AC = 30$	$B \text{ w.r.t } A = 0$

* steps for surveying :

- 1) Data collection ✓
- 2) Data retaining ✓ [in MB → Measurement Book
e.g. Field book, level book.]
- 3) Data plotting ✓
↓ chain surveying ↓ levelling.

** Scale :-

$$\text{Scale} = \frac{\text{Map distance}}{\text{Ground distance}}$$

* Representation :-

$$\text{Scale} :- \frac{1 \text{ cm}}{10 \text{ m}}$$

$$\text{Scale} :- 1 \text{ cm} = 10 \text{ m}$$

every 10 m measured you
to the ground is
represented by just 1 cm
on sheet of paper.

* Representative Factor :-

$$\text{RF} = \frac{1 \text{ cm}}{(10 \times 100) \text{ cm}} = \frac{1}{1000}$$

Scale for Area $\rightarrow [1 \text{ cm}]^2 = [10 \text{ m}]^2$

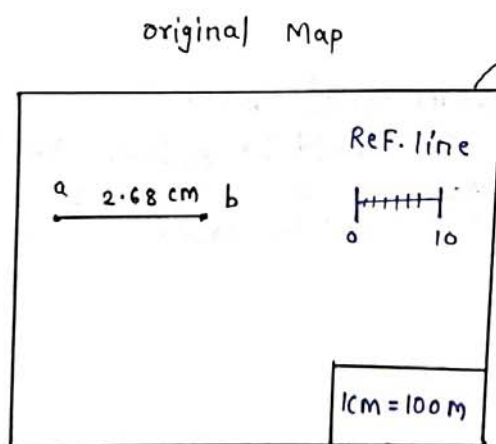
$$1 \text{ cm}^2 = 100 \text{ m}^2$$

$$\therefore \text{Scale} = \frac{1}{1000}$$

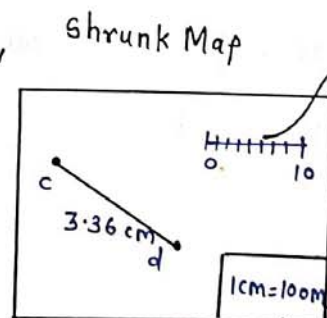
$$\text{Scale } [1 : 1000]$$

** Shrunken / extended Scale :-

Map issue $\rightarrow$ by Survey of India.



$$AB = 2.68 \times 100 = 268 \text{ m (ground)}$$



10 cm
REF. line is
now read as
9.5 cm only

$$cd (\text{Map}) = 3.36 \text{ cm}$$

$$CD (\text{ground}) = \cancel{3.36 \times 100} = \cancel{336 \text{ m}}$$

* Shrinkage Factor = $\frac{\text{shrunk length}}{\text{original length}}$
[SF]

shrinkage & extended map can be identified by Reference line.

Shrunk Scale (SS) = SF × original scale.

∴ SF < 1

EF > 1

→ Soln : SF = $\frac{9.5}{10} = 0.95$

SS = SF × OS

ES = EF × OS

↓
original
scale

∴ SS = $0.95 \times \frac{1 \text{ cm}}{100 \text{ m}}$
Shrunk Scale = $\frac{1 \text{ cm}}{\left(\frac{100}{0.95}\right) \text{ m}}$

∴ cd (Map) = 3.36 cm

CD (ground) = $3.36 \times \frac{100}{0.95}$
= 353.68 m.

Q.24 / WB / Survey

SF = $\frac{9.4}{10} = 0.94$

∴ SS = $0.94 \times \frac{1}{25} = \frac{1}{(25/0.94)}$

a) length = $8.2 \text{ cm} \times \frac{25}{0.94} = 218.08 \text{ m} //$
(ground)

b) Area = $234.5 \text{ cm}^2 \times \left(\frac{25}{0.94}\right)^2 = 165869.73 \text{ m}^2$
(ground)