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CIVIL ENGINEERING

SURVEING

By-JASPAL SIR

- Theory
- Explanation
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15/ March/21

FUNDAMENTALS

→ Surveying is the process of determining the relative position of point on, above and below the surface of earth by means of direct and indirect measurement of "Distance", Direction, & Elevation.

It may also be termed as process of establishing the points by predetermined, angular and linear measurement.

— Due to the curvature of the earth the surveying is primarily classified into 2

Note Earth is an oblate spheroid [Here spheroid is obtained by rotating an ellipse about its one of the axes. Since the polar dia of earth is approximately 43.95 km smaller than equatorial dia. it is termed as oblate spheroid.

(A) Plane Surveying (ii) Geodetic Surveying

(A) PLANE SURVEYING :

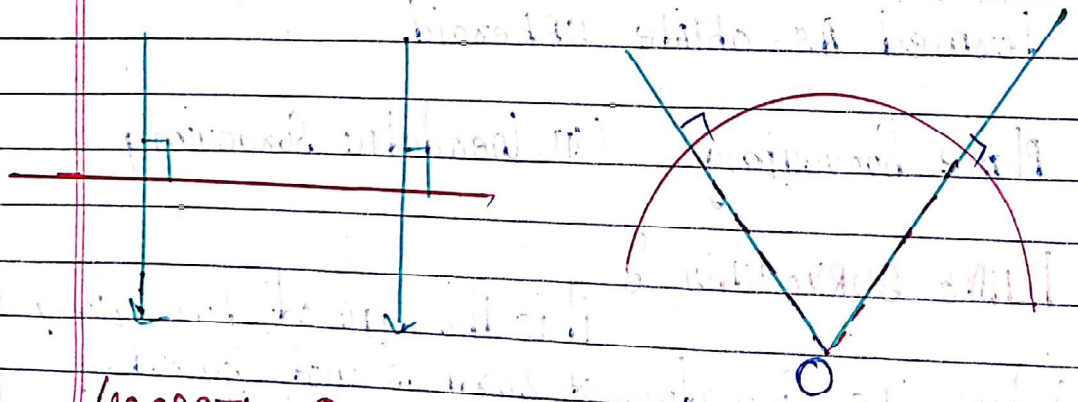
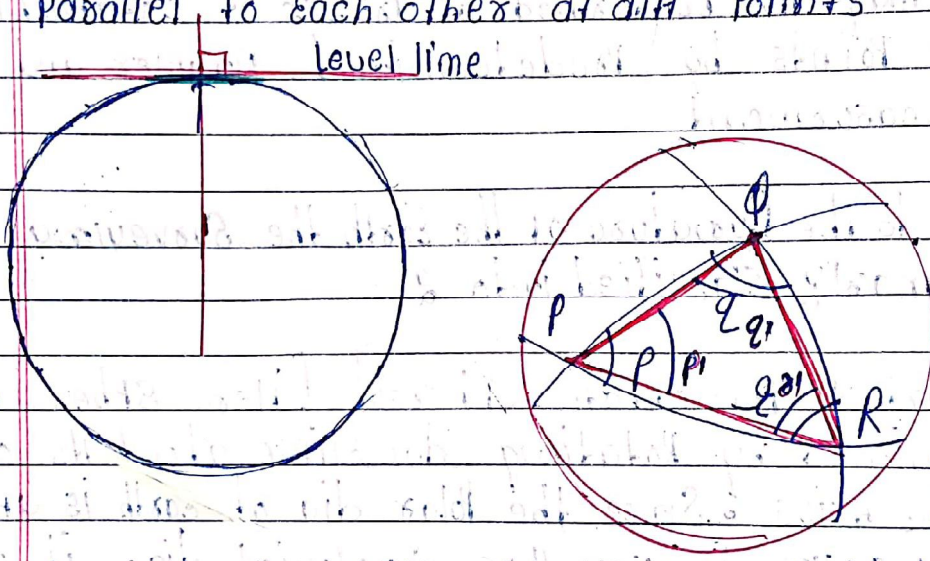
It is the type of surveying in which the curvature of earth is not considered or the mean surface of the earth is to be planned.

— It is suitable to be used for small area of work

— It is considered for an area $< 250 \text{ km}^2$

→ All the lines and triangles formed during survey in this case will be considered as plane line and plane triangle.

→ Here level line is considered to be straight line & plumb lines (line represented by freely suspended "plumb bob" are considered to be parallel to each other at diff. points)



② GEODETIC SURVEYING

That type of surveying in which curvature or shape of earth is taken into consideration. Here all lines lying in the surface are curved lines and triangles are spherical triangles.

15/march/21

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(A) **PLANE SURVEYING**

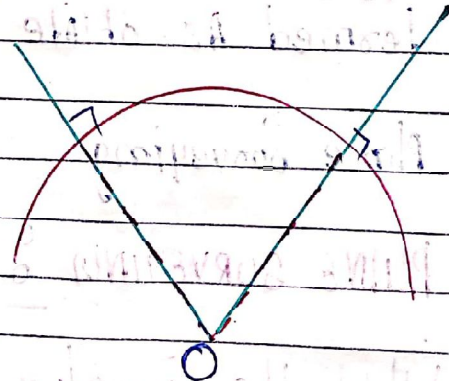
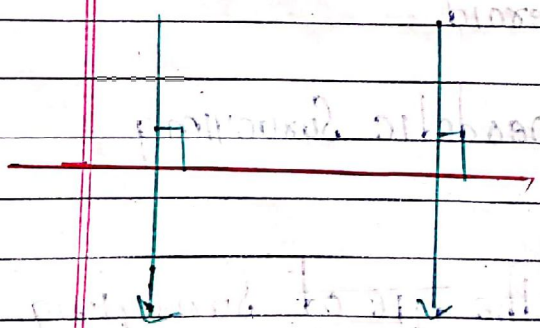
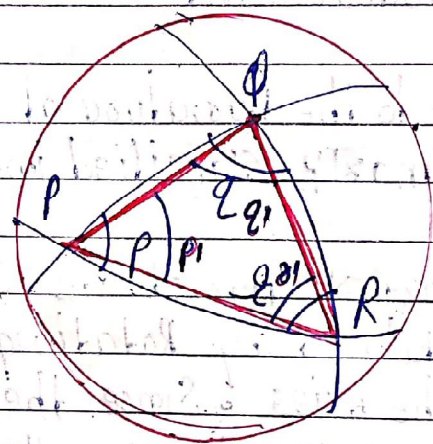
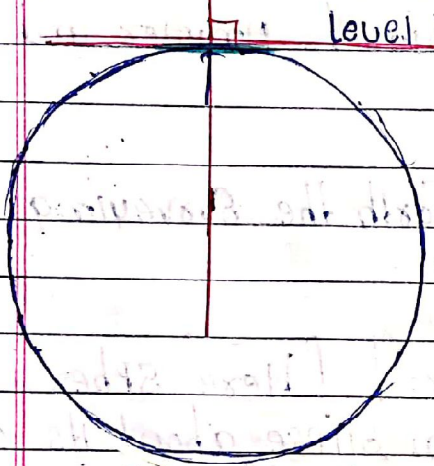
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→ All the lines and triangles formed during a survey in this case will be considered as plane line and plane triangle.

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9) GEODETIC SURVEYING

That type of surveying in which curvature or shape of earth is taken into consideration

→ Here all lines lying in the surface are curved lines and triangles are spherical triangle

→ it is suitable to be used when Area of Surface is large (generally $> 250 \text{ km}^2$) and high degree of precision is required.

→ This Surveying is done by department of national survey of india to established the Control points which are taken as reference point for marking other points in plane surveying.

NOTE For Any triangle with Area 195 km^2 , Sum of interior angles would be just $1''$ ($\pm 1 \text{ sec}$) extra in geodetic surveying.

For Any line of length of 19 km it is just 1 cm extra in geodetic surveying.

Surveying can also be classified as follows:

(1) BASED UPON THE NATURE OF SURVEY

→ ① LAND SURVEY

Here Surveying is done for the features on land.

It is further classified into

① TOPOGRAPHICAL SURVEY

This consist of Horizontal & Vertical location of certain points by linear and angular measurement to determine physical features like River, lake, pond, forest, Hills (Natural), Road, Railways, canal, towns, villages

(II) CADASTRAL SURVEY

These Surveys are made for fixing the Property line and calculation of land Area or the transfer of land Property

(III) CITY SURVEY

These Surveys are made in connection with construction of, Street, water Pipe lines, Sewers, LPH lines, optical fibre

(B) MARINE / HYDROGRAPHIC SURVEY

— It Deals with water bodies for Purpose of navigation water supply, mean sea level, Reservoir functioning, work disposal

— It consist of measurement of discharge of Stream Stage of water body and fluctuation in oceans tides

(C) ASTRONOMICAL SURVEY

It is carried for determining the absolute location of Any Point on the surface of the Earth with the help of Heavenly bodies / Celestial / Spatial bodies Ex Sun, Any fixed Star.

(D) BASED ON OBJECT OF SURVEY: (A) Engg. Survey

(1) This is done to find sufficient data to be used for Engg. design work like Roads Reservoirs, Sewers, trench, foundation etc

(B) MILITARY SURVEY

It is used for determining points of strategic importance.

(C) Geological Survey it deals with determination of formation of Earth strata.

(D) ARCHAEOLOGICAL Survey. This is used to find existence of past civilization.

(E) MINE SURVEY

Carried out for exploration of new mines.

10/10/21 (4) CLASSIFICATION ON THE BASIS OF INSTRUMENT USED:

(1) CHAIN SURVEYING

It is the simplest type of surveying in which only linear measurements are taken either with chain or tape.

— Angular measurements are not taken in chain surveying.

(2) COMPASS SURVEYING

In this type of surveying horizontal angles are measured with the help of magnetic compass. In addition to this linear measurement is taken with the chain or tape.

→ Although magnetic compass is not precise in measuring angles. Hence this surveying is not very accurate. However it is more accurate than chain surveying.

③ LEVELLING :

In this type of survey levelling instrument is used to determine relative elevations of various points in vertical plane.

④ PLANE TABLE SURVEYING

In this survey, a map or plan is prepared in field by observing the terrain after determining the direction of various lines and measuring the linear distances with the chain.

The accuracy of this survey is low but in this case measurement and plotting are done together.

⑤ THEODOLITE SURVEYING

In this type of survey theodolite is used for measurement of horizontal and vertical angles.

Its accuracy is comparatively more than compass surveying.

— It is further classified as
Transverse survey.

Triangulation survey