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Q_1

TRANSITION CURVES :-

- A Curve of varying radius is called a transition curves. it is also called spiral curves or Easement curves.
- It is used on both highway and railway b/w tangent & a Circular Curve in order to have a smooth transition from tangent to the curve & from curve to tangent.
- It is also inserted b/w two branches of Compound.

SUPER ELEVATION:-

It is the amount by which the outer edge of a curve on a road or railway is blanked above the inner edge when a vehicle passes to a curved path. The following force act

(i) weight of the Kehicle
(ii) Centrifugal force both acting through the center of gravity of vehicle.

The effect of the centrifugal force is to push the vehicle off the track. Now to contract the action The plane of the road surface is made prependicular to resultant of centrifugal

force. and weight of vehicle.

In other word the outer bank of road is raised above the inner one. This rising of outer bank ove the inner one is known as super elevation,

W = weight of vehiche.

P = Centrifugual force.

V = speed of vehicle.

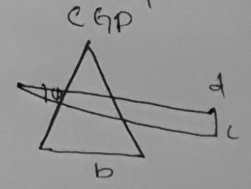
g = acceleration due to gravity.

R = radius of curve.

h = super elevation in m

b = width of road in m.

$\bar{h}$ = Distance b/w center of gravity.



For Equilibrium

The resultant of weight & centrifugal force must be equal and apposite to the reaction perpendicular to road

As we know that

$$P = \frac{WV^2}{gR}$$

$$\Rightarrow \frac{P}{W} = \frac{V^2}{gR}.$$

If ϕ is the inclination of road surface the inclination of resultant to vertical is also ϕ.

so we have.

on Road :-

$$b \tan\phi = V^2/gR.$$

on Railway

$$b \tan\phi = \frac{GV^2}{gR}$$

Radius

$$b = \tan\phi = V^2/gR.$$

$$R = V^2/b\tan\phi g \quad \text{(for road)}$$

$$R = \tan\phi = GV^2/gR$$

$$R = GV^2/b\tan\phi \quad \text{(For railway)}$$

Speed of vehicle.

$$b\tan\phi = V^2/gR$$

$$V^2 = b\tan\phi gR.$$

$$V = \sqrt{b\tan\phi gR}$$

(For road)

$$b\tan\phi = GV^2/gR$$

$$V^2 = \frac{b\tan\phi gR}{G}$$

$$V = \sqrt{\frac{b\tan\phi gR}{G}}$$

(For railway).

Q(2)

	TRIANGULATION	TRILATERATION
1)	All Angles are measured in traingulation	All sides are measured in trilateration
2)	Distance of baseline is measured	Azimuth of the initial line is measured
3)	Some check base lines are also measured to Controll scale error	Some check angles are measured to Controll azimuth error
4)	Intervisibility b/w station is essentail.	For small areas it is possible to measure distance without intervisibility
5)	There are move internal checks in Comparsion with trilateration in the sane geometric figure.	There are less internal checks in Comparsion with traingulation in the sane geometric
6)	The side length are Completed on the basis of measured angle applying sine law	The angle are ~~Composed~~ Computed on the basis of measured side lengths apply Consin law

PRINCIPLE OF TRAINGULATION:-

→ If all the three angles and the length of one side of a triangle are known, then by trigonometry the lengths of the remaining sides of the triangle can be calculated

→ Again, if the coordinates of any verter of the triangle and azimuth of any side are also known, then coordinates of the remaining vertices may be computed.

PRINCIPLE OF TRILATERATION:-

→ Trilateration is a high occurate and precise method of establishing and expanding horizontal control.

→ Method of control survey in which a network of traingles is used as in traingulation system.

→ All the three sides of each traingles are measured in the field with the distance measuring instruments (EDMs, tapes, other apparatus).

→ Horizontal angle are not measured in the field.

→ Angles in a trileration system are computed indirectly from the lengths of the sides of triangle by Cosine formula.

→ Few horizontal angle are also sometime measured to provide a check on computed angles.

→ Trilateration is adjusted after the computation of the angles and then coordinates of the stations are determined.

→ Astronomical observations for azimuth are also made at selected stations

→ Vertical Angles are also measured where elevation have not been established.

Cosine Rule:

$$a^2 = b^2 + c^2 - 2bc\cos A$$

$$2bc\cos A = b^2 + c^2 - a^2$$

$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

$$A = \cos^{-1}\left(\frac{b^2 + c^2 - a^2}{2bc}\right)$$

Q3
(A)

HYDROGRAPIC SORVEY :-

Hydrographic Surveying or bathymetric Surveying is the survey of physical features present under water. It is science of measuring all factors beneth water that effect all the marine activities like dreding, Marine Construction offshore drilling etc.

Hydrographic Surveying is mainly Conducted under authority Conern. It is mainly Carried by means of sensor, Sounding or electronic sensor system for shollow water.

WHY WE DO HYDROGRAPIC SURVEYING:-

1) Depth of bed can be determined
2) Shove lines can be determined
3) Locating sower fall by measuring direct current
4) Locating mean sea level.
5) Tide measurement
6) River & stream discharage measurement.

Factors To Be Determined While Conduct Hydrographic survey :-

Following are the factors which would be done while doing and Conduct Hydrographic survey.

A) Survey Equipment

B) Issue to a designated unit

C) Programme planning of that unit.

D) assessment of the task with in that unit.

E) Recormaussance requirment

F) Resoure allocation

G) Detailed survey planning.

Q3
(B)

SOUNDING :-

The measurment of depth below the water surface is Called Sounding. This Corresponds to the ordinary spirit leveling. in land Surveying where depth are measured below Horizontal ~~surface~~ line establish by level. The object of making Sounding in thus to determine the configuration of the sub aqueous sources.

PURPOSE FOR SOUNDING:-

⇒ Sounding is the most important for any water body to improve its negliable properties to know about sitting & Scouring etc.

⇒ In Hydrographic Surveying Sounding is the measurement of depth below the water.

⇒ In short the main purpose & objective of Sounding to measure and find the depth below the water surface.

EQUIPMENT:-

1) Sounding boat
2) Sounding rods and poles
3) Lead lines
4) Sounding Machine
5) Fathometer.

Q4:- (A)

AERIAL PHOTOGRAMMETERY:-

Aerial photogrammetery technique of photographing the Earth's surface or features of its atmosphere or hydrosphere with Cameras mounted on aircraft, rockets, or Earth-orbiting stallelites and other spacecraft.

WHY WE DO it :-

Aerial photogrammetery Consit of Using the imagery gathered in the air by UAVs to create Computer-generated 2D & 3D models These models are topographical in nature, meaning they represet the dimensions and physical feature

Q4 (B)

PROCEDORE FOR AERIAL PHOTOGRAPHY:-

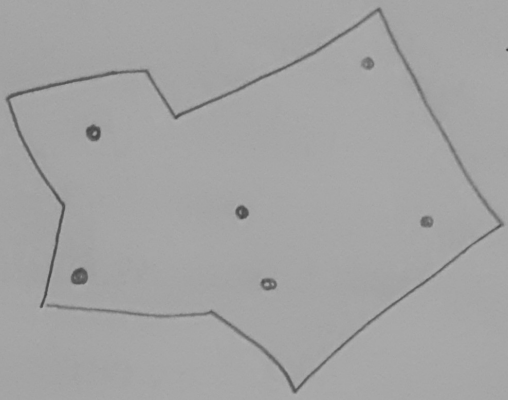
- Establishing Contral points
- Flight planning and photography.
- Photo interpretation & stereoscopy
- Parallax and measurement of parallax
- Construction of map and Cartography.

1)

ESTABLISHING CONTROL POINTS:-

Control points are points established on ground with known relative position. The photograph captured is observed by setting these Contral points are boundaries. so the points should be established in such way that they should be easily identifiable on photograph.

There should be minimum of 3 to 4 control points are need in one photograph.



2) FLIGHT PLANNING AND PHOTOGRAPHY :-

Flight planning is nothing but knowing the height to be mainted ain by flight while taking photos, area are to be covered in each photograph number of photographs no of strips, & time interval b/n exposures This planning mainly depends upon the following factors.

- Area to be surveyed
- Focal length of camera
- Overlap
- Scale of photograph
- Ground speed of aircraft in still air.

5) PHOTO INTERPRETATION & STEREOSCOPY:-

Photo interpretation is done by the instruments called stereoscope which contains magnifiers. So, one can observe the three-dimensional model of area through it & it also ease the drawing of maps of photographed area. For accuracy, control stations, elevation, length of line should be sufficiently avaiable.

They are namely.

- Lens stereoscope.
- Mirror stereoscope.
- Scanning mirror stereoscope.
- Zoom stereoscope.

4) PARALLAX AND MEASUREMENT OF PARALLAX.

An aerial photograph can be studied to get the location of an object by its co-ordinates in the photograph.

Similarly, to know the third dimension of same objects there should be minimum of two points of observation is needed from different angles.

In general Measurement of parallax can be done by two ways.

- Floting Marks
- Parallax bar.

5) CONSTRUCTION OF MAP & CARTOGRAPHY :-

After Collecting all Photographs, it's time to Create or plot the map there are several methods available to plot the details of map and they are.

- Radial line Method
- Slotted template Method
- Stereoscopic Method.