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Survey

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(2)

Q1 What is Transition curve, how super elevation is effected by the speed of vehicle and radius of the curve?

Ans. Transition curve:

A curve of varying radius is called transition curve between tangent and a circular curve. It is also know as spiral curve. It can be inserted in between the two branches of a compound or reverse curve.

Types:

These are three common types of transition curves which are given below.

- ① cubic Parabola (railways)
- ② clothoid or spiral (railways)
- ③ Lemniscate (highways)

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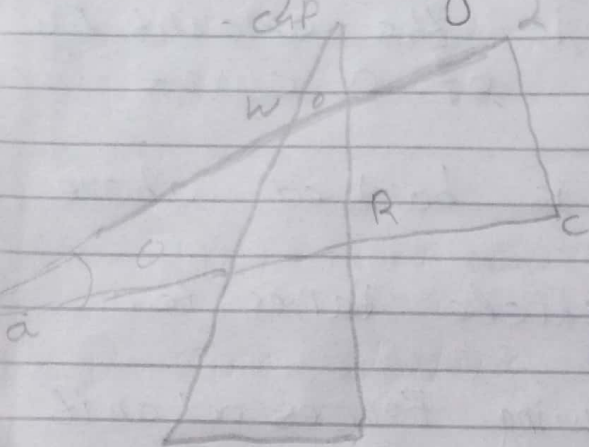
Superelevation:

It is the amount by which the outer edge of a curve on a road or railway is banked above the inner edge when a vehicle takes to a curved path. The following forces act on it

- ① weight of vehicle
- ② centrifugal force both acting through centre of gravity of vehicle.

The effect of centrifugal force is to push the vehicle off the track. Now to counteract the action, the plane of the road surface is made perpendicular to resultant of centrifugal force and weight of vehicle. In other words the outer bank of road is raised above the inner one. This raising of outer bank over the inner one is known as superelevation.

Mathematically



w = weight of vehicle

P = centrifugal force

v = speed of vehicle

g = acceleration due to gravity

R = radius of curve

h = super elevation in

b = width of road

G = distance between centre of rail

For equilibrium

The resultant of weight and centrifugal force must be equal and opposite to the reaction perpendicular to road.

As we know that

$$P = \frac{w v^2}{gR}$$

$$\Rightarrow \frac{P}{w} = \frac{v^2}{gR}$$

If θ is the inclination of road surface

The inclination of resultant to vertical

is also θ

so we have

$$\tan \theta = \frac{dc}{ac} = \frac{P}{w} = \frac{bv^2}{gR}$$

on Roads:

$$b \tan \theta = \frac{v^2}{gR}$$

on Railways:

$$b \tan \theta = \frac{Gv^2}{gR}$$

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Radius:

$$b \tan \theta = \frac{v^2}{gR}$$

$$R = \frac{v^2}{b \tan \theta g} \quad (\text{For roads})$$

$$b \tan \theta = \frac{Gv^2}{gR}$$

$$R = \frac{Gv^2}{b \tan \theta} \quad (\text{For railways})$$

Speed of vehicle:

$$b \tan \theta = \frac{v^2}{gR}$$

$$v^2 = b \tan \theta g R$$

$$v = \sqrt{b \tan \theta g R}$$

(For roads)

$$b \tan \theta = \frac{Gv^2}{gR}$$

$$v^2 = \frac{b \tan \theta g R}{G}$$

$$v = \sqrt{\frac{b \tan \theta g R}{G}}$$

(For railways)

Q.No 2

Triangulation:

Triangulation

is a Process in Surveying in which tracing and Measurement of a Series of a network of triangles is used for determining distance and relative positions of Point over an area.

Principles of triangulation:

- A In triangulations, all the three angles of each triangle are in the field along with one base line.
- A The side of the first triangle whose length is predetermined is called base line; and vertices of the individual triangles are known as triangulation stations.
- A To minimize accumulation of errors in lengths. subsidiary bases at suitable

intervals are provided.

(b) Trilateration:

The method of surveying in which the lengths of the sides of a triangles are information angles are computed.

This method does not involve the measurements of angles.

Principles of trilateration:

* It is a method of control survey in which a network of triangles is used as in triangulation.

* All the three sides of each triangle are measured in the field.

Difference between triangulation and trilateration:

① In triangulation All angles of the triangles are measured while in trilateration, all sides of triangles are measured.

② In triangulation, base line is measured while in trilateration Azimuth of initial line is measured.

③ For triangulation, intervisibility between stations are essential while in trilateration it is possible to measure distances without intervisibility.

④ There are more internal checks in triangulation as compared to that of trilateration.

→ With distance measuring instrument

- Horizontal angles are measured in the field.

- Trilateration is adjusted after the

computation of the angles and then coordinates of the stations are determined.

- In trilateration, angles are computed

indirectly from the lengths of the sides of triangles.

Q No 3 Hydrographic survey:

Part (A)

Hydrographic surveying or bathymetric

surveying is the survey of physical

features present underwater. It is

science of measuring all factors

beneath water that affect all the marine

activities like dredging, Marine construction

off shore drilling etc.

Hydrographic surveying is

mainly conducted under authority concern

It is mainly carried by means of

sensor, sounding or electronic sensor

system for shallow water.

Why we do Hydrographic surveying:

In order to get following information we do Hydrographic surveying.

- 1, Depth of bed can be determined.
- 2, Shore lines can be determined.

3) Locating sewer fall by measuring direct current.

4) Locating Mean sea level.

5) Tide measurement

6) River and stream ~~dist~~ discharge measurement.

7) Massive structures like bridges dams harbours are planned.

→ Factors to be determined while conducting Hydrographic survey:

Following are the factors which would be done while doing and conducting Hydrographic surveying.

a) Survey Equipment

b) Preparation of a Hydrographic survey

specification (To include a review of existing data)

c) Issue to a designated unit.

d) Programme planning of that unit.

e) assessment of the task with in that unit.

f) Reconnaissance requirement.

g) Resource allocation.

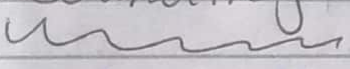
h) Detailed survey planning.

i) Plans for compilation and checking of data.

Q No 3

Part B

Sounding :-

 The measurement 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 line establish by level. The object of making sounding is thus to determine the configuration of the sub aqueous source.

⇒ Purpose of Sounding:

⇒ Sounding is most important for any water body to improve its negligible properties to know about sitting and

Scouring etc.

⇒ In Hydrographics surveying sounding is the measurement of depth below the water surface

⇒ In short the main purpose and objective of sounding is

Measure and finding the depth below the water surface.

⇒ Equipment:

- 1) Sounding boat
- 2) Sounding rods and poles
- 3) Lead lines
- 4) Sounding machine
- 5) Fathometer*

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Q.4 Part(A) Aerial Photogrammetry

Aerial Photogrammetry is a process in which an aircraft with camera is used to take photograph from certain height in the air. A minimum 3 to 4 control point needed in one photograph.

Reason for use of Aerial Photogrammetry.

Following are some of the reasons for use of Aerial Photogrammetry.

It is used because it provides computer generated 2D and 3D Models. These models are topographical in nature. They represent the dimensions and physical features of the area of land and in stunning accuracy. These models can be rotated and zoomed.

Along with ~~surveying~~ surveying, many of the uses of Aerial

~~Photo~~ Photogrammetry in different Fields.

Q No 4

Part B. Procedure of aerial Photography.

Following are the main steps of Aerial Photography.

- Establishing control points.
- Flight Planning and Photography.
- Photointerpretation and stereoscopy.
- Parallax and measurement of Parallax.
- construction of Map and costography.

Establishing control points:

Control points are points established on ground with known relative positions.

The photograph captured is observed by setting these control points as benchmarks.

These should be minimum 3 to 4 points.

(Control point) in a photograph.

Flight Planning and Photography:

Flight Planning is actually knowing the height to be main while taking photography. Photo area to be covered in each ~~photograph~~ photography. Number of photography no of strips and time interval between exposures.

