

Name :- Mian Zeeshan ulla h

ID :- 7906

Subject :- Advance Engineering
Survey (II)

Section :- A

Teacher :- Engr Sir Farhan

22 Jun, 2020.

①

Question # 01

What is Transition curve? How super elevation is effected by the speed of vehicle and radius of the curve? Prove it with the help of equation and diagram.

ANSWER:-

TRANSITION CURVE:-

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

(2)

Types:-

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

- i) Cubic Parabola (railways)
- ii) Clotoid or Spiral (railways)
- iii) Lemniscate (Highways).

Superelevation:-

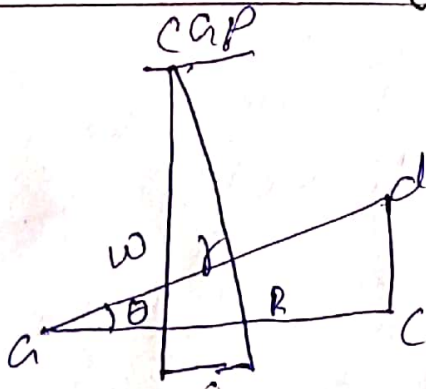
It is the amount by which the outer edge of a curve on a road or railway is banked above the inner edge. When a vehicle passes to a curved path, the following forces act on it:

- i) weight of vehicle
- ii) Centrifugal force both acting through centre of gravity of vehicle.

(3)

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.



(4)

where

w = weight of vehicle

P = centrifugal force.

u = speed of vehicle (m/sec).

g = acceleration due to gravity.

R = radius of curve.

h = super elevation in m.

b = width of road in m

a = Distance b/w centre of roads'

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

As we know that

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

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

If θ is the inclination of road surface the inclination of resultant the 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

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

⑥

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

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

$$u^2 = b \tan \theta gR$$

$$u = \sqrt{b \tan \theta gR}$$

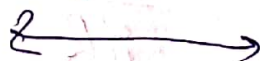
(For roads).

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

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

$$u = \sqrt{\frac{b \tan \theta gR}{G}}$$

(For railways)



(7)

Question # 02

What is the difference b/w triangulation and Trilateration? Also explain the principle of triangulation and trilateration.

Answer:-

Triangulation

Triangulation is a process in surveying in which tracing and measurement of a series or a network of triangles is used for determining distances and relative positions of points over an area.

Principles of Triangulation:-

→ In triangulations, all the ~~angle~~ three angles of each triangle are.

②

in the field along with one base line.

→ The side of the first triangle whose length is predetermined is called base "line" and vertices of the individual triangles are known as triangulation station."

→ 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 side of a triangles are measured and from this information angle are computed.

(9)

Principle 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.
- with distance measuring instruments.
- Horizontal angles are measured in the field.
- Trilateration is adjusted after the computation of the angles and then coordinates of the stations are determined.

(10)

→ In trilateration, angles are computed indirectly from the lengths of the sides of triangle.

Difference b/w 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.

(11)

(3) For triangulation, intervisibility between stations are essential while in trilaterations, it is possible to measure distance without intervisibility.

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



Question #03

(Part-a)

What is hydrographic survey? why we do it and what are the factors to be determined while conducting hydrographic survey?

ANSWER:-

Hydrographic Survey:-

Hydrographic surveying or bathymetric surveying is the survey of physical features present under water. It is science of measuring all factors beneath water that affect all the

marine construction offshore 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 discharge measurement.
- 7) Massive structures like bridges dams harbors are planned.

→ why we do Hydrographic Surveying.

we do it because of getting information and all related detail while doing construction under water.

(15)

These survey also take part in necessary data collection relating to construction and development of port facilities such as pier construction.

This help in finding the loss in capacity due to silt and many uncertainties.

(Part-b)

Sounding

The measurement of depth below the water surface is called sounding. This corresponds to the ordinary spirit leveling in land

P.T.O

(16)

Surveying where depths are measured below horizontal line established by level. The object of making sounding is thus to determine the configuration of the subaqueous source.

⇒ Purpose of Sounding:

→ Sounding is most important for any water body to improve its negligible properties, to know about silting and scouring etc.

→ In Hydrographic Surveying sounding is the measurement of

P.T.O.

depth below the water surface.

→ In short the main purpose and

objective of sounding to

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) Fathometes -



Question #04

Part (a)

a) what is aerial photogrammetry and why we do it?

Answer:

Aerial photogrammetry:

In Aerial photogrammetry an air craft with camera setup is used to take photographs from the air flying over the ground in this article we will discuss about the aerial photography.

Procedure of Aerial photography:-

- Establishing Control points
- Flight plan.
- photo interpretation and stereoscopy
- Parallax and measurement of Parallax
- construction of map and Cartography.

So, photogrammetry is the science and technology of obtaining spatial measurement and other geometrically reliable products from photographs.

Principle Application.

The principle application of photogrammetry is to determine the

P.T.O

(20)

Spatial position of the natural and man-made features situated on the earth surface.

Why we use it :-

→ Photogrammetry is also used as a measuring tool in architecture industrial design deformation studies of structures accident investigation medicine etc. These operations are referred to as non-topographic application.

Part (b) :-

Procedure of Aerial Photography.

1) 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 boundaries. So the point should be established in such a way that they should be easily identifiable on photograph.

2) Flight Planning and Photography.

Flight Planning is nothing but knowing the height to be maintained by flight while taking photos, area to be covered in
PTO.

each photograph, number of photographs, no. of strips and time interval b/w exposures. This planning mainly depends upon the following factors:

→ Area to be surveyed

→ Focal length of camera

→ Overlap

→ Scale of photograph

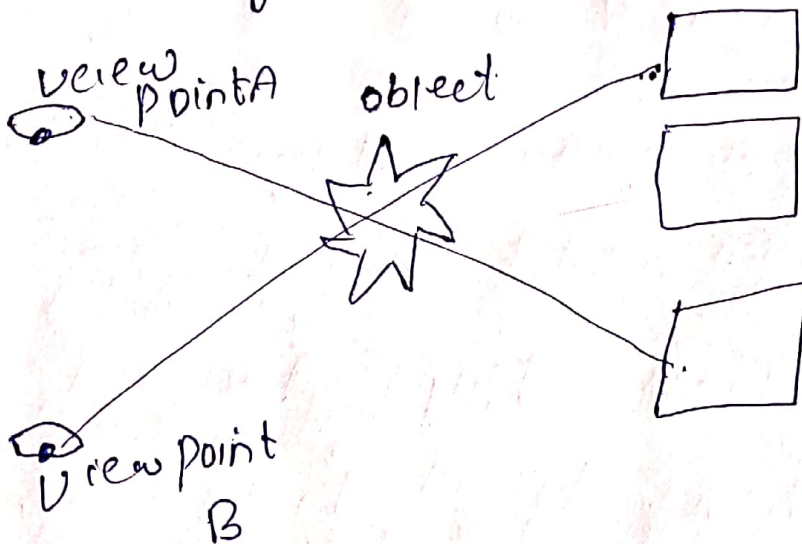
Parallax and measurement of

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 some object, there should be minimum of two points of observation is needed from different angle parallel is nothing but a displacement of an object in the photograph when point of observation is shifted to another angle.



(24)

Photo interpretation and stereoscopy.

Photo interpretation is done by the instrument called stereoscope which contain magnifiers, so one can observe the three-dimension model of area through it and it also ease the drawing of maps of photographed area. For accuracy, control stations elevation, length of lines should be sufficiently available.

