

Paper: 2

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Section A.

Q1)

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

Definition of transition curves:

A transition curve may be defined as a curve of varying radius of infinity at tangent point to a design circular curve radius provided in between the straight and circular path in order that the centrifugal force was gradual. This is also known as easement curve. The objectives of providing transition curve are given below.

- To gradually introduce the centrifugal force between the tangent point and the beginning of the circular curve thereby avoiding sudden jerk on the vehicle.
- To increase the comfort of passengers.
- To introduce designed super-elevation at a desirable rate.
- To enable the driver to turn the steering gradually for his own comfort and security.
- To introduce designed extra widening at a desirable rate.
- To fit road alignment in a given alignment.

Super elevation

When vehicle moves from tangent on to the curve the forces acting on it are

- weight of the vehicle.
- centrifugal force, Both acting through the center of gravity of the vehicle.

The effect of the centrifugal force is to push the vehicle off the rail or road.

To counter act the action the outer rail or outer edge of the road is raised above the inner one. The raising of outer edge of rail road above the inner one is called super elevation or cant.

The amount of super elevation depends upon

- speed of the vehicle.
- Radius of the curve.

Let

w = weight of the vehicle.

P = centrifugal force.

v = speed of the vehicle, m/s.

g = Acceleration due to gravity, m/s².

R = Radius of the curve, m.

h = super elevation, m.

b = width of the road, m.

①
②

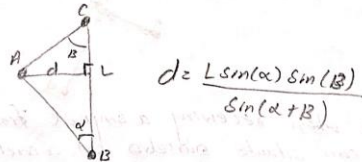
What is the difference between triangulation and trilateration? Also explain the principles of triangulation and trilateration.

Ans

Difference between triangulation and trilateration:

Triangulation:

Triangulation is a very ancient technique, said to date from over 2500 years ago when it was used by the Greek philosopher and astronomer Thales of Miletus to measure (with surprising accuracy) the radius of the Earth's orbit around sun.



It allows an observer to calculate their position by measuring two directions towards two reference points, since the positions of the reference points are known. It is hence possible to construct a triangle where one of the sides and two of the angles

are known. with the observes at the third point. This information is enough to define the triangle completely

Trilateration :

This technique requires the distance between the receiver and transmitter to be measured. This can be done using a received signal strength indicator (RSSI) or also from the time of arrival, or time of flight, of the signal, provided that the receiver and transmitter are synchronized for example, by means of a common time base, as in GPS.



Thus when receiving a signal from a single transmitter we can situate ourselves on a circle (for simplicity, let's confine ourselves to two dimensions and ideal transmission condition) with the transmitter at the center. Not very accurate. It gets better with two transmitters. - Now there are only two positions possible. The two points where the circle around the two transmitters intersect.

Principles of triangulation

- In triangulations all the ~~time~~ three angles of each triangle are 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 stations.
- To minimize accumulation of errors in length, subdividing bases at suitable intervals are provide.

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 triangles are measured in the field with distance measuring instrument.
- Horizontal angles are measure in the field.
- Trilateration is adjusted after the computation of the angles and " " the

In trilateration angles are computed indirectly from the lengths of the sides of triangles.

The side of the triangle which is perpendicular to the line of sight is called the base line. The other two sides are called the legs. The angle between the legs is called the included angle. The angle between the base line and one of the legs is called the angle of observation. The angle between the base line and the other leg is called the angle of resection.

Properties of trilateration

It is a method of control survey in which a network of triangles is established. The three sides of each triangle are measured in the field. The angles are then computed from the lengths of the sides.

Q3 (part - a)

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

Ans

Hydrographic survey

Hydrographic survey 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 main activities like dredging, marine construction, offshore drilling etc.

Hydrographic surveying is mainly conducted under authority concern. It is mainly carried by means of sensors, sounding or electronic sensor systems for shallow water.

2) 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 discharge correct.
- 4) Locating mean sea level.
- 5) Tide measurement.
- 6) River and stream discharge measurement.
- 7) Massive structure like bridges, dams, harbours are planned.

⇒ Factor 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(3) (part - b)

What is sounding and purpose of sound
Also name equipments use to determine sounding;

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 established by level. The object of making sounding in this to determine the configuration of sub aqueous source.

=> Purpose of Sounding:

=> Sounding is most important for and water body to improve its navigable properties to know about silting and scouring etc.

→ In Hydrographic Surveying Sounding is the measurement of depth below the water surface

→ In short the main purpose and objective of sounding is to measure and find the depth below the water surface

⇒ Equipment

- 1) Sounding boat
- 2) Sounding rods and poles
- 3) Lead lines
- 4) Sounding machines
- 5) Fathometers.

Q4) (10 a)

What is aerial photogrammetry and why we do it?

Aerial photogrammetry:

In the terrestrial photogrammetry are taken from a fixed position on ground while in the aerial photogrammetry an aircraft with camera setup is used to take photograph from the air flying over the ground. In this article we will discuss about the aerial photography procedure of Aerial Photography:

- 1) Establishing control point
- 2) Flight planning and photography
- 3) Photo interpretation and stereoscopy
- 4) Parallax and measurement of parallax
- 5) construction of map and cartography.

Reason for use of Aerial photogrammetry.

Following are some of the reasons for uses 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 storing accuracy these model can be rotated and zoomed.

Along with surveying many of the uses of Aerial photogrammetry in different fields.

Q4) (part - b)

b) Shortly explain the procedure of aerial photography.

Procedure of Aerial Photography:

- Following are the main steps of aerial photography.
- Establishing control points.
 - Flight planning and photography.
 - Photo interpretation and stereoscopy.
 - Parallax and measurement of parallax.
 - Construction of map and cartography.

Establishing control points control points are points established on ground with known relative positions. The photography captured is derived by ~~the~~ setting control points as boarders. There should be minimum 3 to 4 points (control points in a photograph).

Fight planning and photography:

Planning is crucially knowing the height to be maintained while taking photos area to be covered in each photograph
Number of photographs no. of strips and the time interval between exposures.