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Question No 1st:-

Answer:- TRANSITION CURVE:-

A Curve of varying radius is called transition curve between tangent & a circular curve. It is also known as spiral curve. It can be inserted in b/w the two branches of a compound or reverse curve.

TYPES: There are three types of transition curve which are:

- Cubic Parabola (Railways)
- Clothoid or Spiral (Railways)
- Lemniscate (High ways.)

Superelevation: It is the amount by which the outer edge of curve is above the inner edge when a vehicle passes to a curved path, ~~the~~

The following forces acts on it.

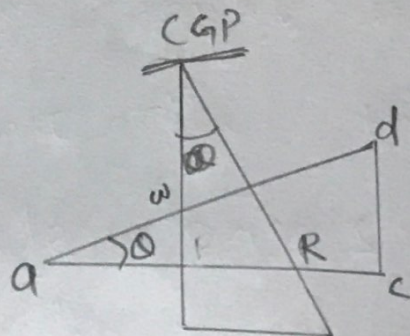
i) Weight of vehicle.

ii) 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 road surface is made perpendicular to resultant of centrifugal force and weight of vehicle. The outer bank of road is raised above the inner one. This raising of outer bank over inner one is called Superelevation.

Mathematically:



W = weight of vehicle

R = Radius of curve

b = width of road in m

G = Distance b/w centre of rails

g = accelⁿ

P = Centrifugal force

For Equilibrium:

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

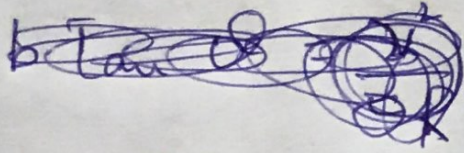
As we know that

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

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

If θ is 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 Road

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

• On Railways:

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

Radius :-

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

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

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

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

Speed of vehicle:

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

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

$$v = \sqrt{b \tan \theta g R} \quad (\text{For loads})$$

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

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

$$v = \sqrt{\frac{b \tan \theta gR}{G}} \quad (\text{For railways})$$

Question NO 2nd :-

Ans

TRANGULATION :-

Trangulation is a processes in surveying in which trancing and measurement of a series or a network of triangle is used for determining distance and relative positions of a points over an area.

• PRINCIPLES OF TRANGULATION:

In Trangulation all the three angles of each triangle are in the field along with one base line.

• The side of first triangle whose length is predetermined

is called "base line" and
verticall of individual triangles
are known as "trangulation station"

- To minimize accumulation of errors
in lengths. Subsdreuy bases at
Suiteble intervals are provided

(b) Trilateration:

The method of Surveying
in which the length of sides
of triangle are measured and
from this information angles
are Computed.

This method does not involves
the measurements of angles.

PRINCIPLES OF TRILETRATION:

- * 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 instrument.
- * Horizontal angles are measured in the field.
- * In trilateration, angles are computed indirectly from the length of the sides of triangles.

Difference b/w triangulation & trilaterations:

- 1) In triangulation, All angles of the triangles are measured while in trilateration, All sides of the triangle are measured.
- 2) In triangulation, base line is measured while in trilateration Azimuth of initial line is measured.
- 3) There are more internal checks in triangulation as compared to trilateration.

Question No 3rd:
Part "a"

Ans: Hydrographic Survey :-

Hydrographic or bathymetric
Surveying is the Survey of
Physical features present under water

It is Science of
measuring all factors beneath
water that effect all the
marine activities like drilling
etc.

Hydrographic Surveying
is mainly conducted under
authority concern. It is

It is mainly carried by means of sensor, soundings or electronic sensor system for shallow water.

• Why we do Hydrographic

Surveying: In order to get the following information we do hydrographic surveying.

- Depth of bed can be determine.
- Shore lines can be determine.
- Locating sewer fact by measuring direct current.
- Locating mean sea level.
- Tide measurement.
- River & stream discharge measurement.

Factors to be determined while Conducting hydrographic Surveys:

Following are the factors which would be done while doing and conducting hydrographic survey.

- *) Survey equipments.
- *) Preparation of a hydrographic survey Specification (to include a review of existing data)
- *) Issue to designated unit.
- *) Reconnaissance requirements.
- *) Resource allocation.
- *) Detailed survey planing.
- *) plans for compilation and checking data.

Question NO 3rd

Part 2nd (B) :

Ans

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 is to determine the configuration of subaqueous source.

- Purpose of Sounding: Sounding is most important for any water body to improve its negligible properties to know about

Setting and scouring etc.

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

Equipments:

- 1) Sounding boat.
- 2) Sounding rods & poles.
- 3) Lead lines
- 4) Sounding machine.
- 5) Fathometer.

Question NO 4

Part A

Ans \rightarrow Aerial photogrammetry:-

Aerial photogrammetry is process in which an aircraft with camera is used to take photograph from certain height in Air. A minimum 3 to 4 control points needed in one photograph.

Reasons for use of Aerial Photogrammetry.

Following are the reasons for why we 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

the dimensions & physical feature
of the area of land and in
stuning accuracy.

These models can rotated
and zoomed.

Along with survey may of the
uses of Aerial photogrammetry in
different fields.

Question No 4
Part 2nd (B)

PROCEDURE OF AERIAL PHOTOGRAPHY

The following are main steps of Aerial photography.

- * Establishing control points
- * Flight planing & photography.
- * photointerpretation and stereoscopy.
- * parallax & measurement of parallax.

1) Establishing Control points :-

Control points are points established on ground with known relative position. The photograph captured is ~~also~~ corrected by setting these

Control points as boundaries. There should be minimum 3 ~~to~~ to 4 points in a photograph.

2) Flight planning & photography:-

Flight planning is actually knowing height to be maintained while taking photo, area to be covered in each photograph, Number of photograph no of strips and time interval b/w exposures.

3) Photo interpretation & stereoscopy

Photo-interpretation is done by stereoscopy which contain magnifiers. we can observe the three dimensional models of area & easily we can go for drawing of maps of photographed area. For accuracy, control station elevations length of lines should be available.

There are four types of stereoscopy are available

* Lens Stereoscopy.

* Mirror Stereoscopy.

* Scanning mirror Stereoscopy.

* Zoom Stereoscopy.

4) Parallax & measurement of parallax.

Parallax is a error. It is displacement of object in photograph when point of observation is shifted to another angle.