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→ Advance Engineering

→ Surveying

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→ Final paper.

→ Section - A.

Q No # 1 :->

①

Answer :->

Transition Curve :->

Transition Curve as the name suggest is usually a horizontal curve in plan provided to allow transition from a straight alignment to a circular curve gradually. In other words "it is curve which connects a straight line with infinity which connects a straight line with infinity radius and radius 'R'". Transition Curve is usually provided between a straight and curved track / road.

Types :->

There are three main common types of transition curve which are following.

- (1) Cubic parabola (Railway).
- (2) Clothoid or spiral (Railway).
- (3) Lemniscate (Highways).

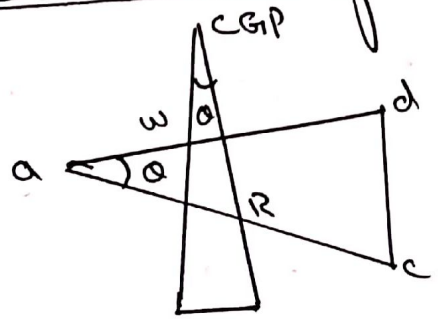
Superelevation :-> It is the amount

Curve on a road or railways (2) is banked above the inner edge. When a vehicle passes 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.

⇒ Centrifugal Force :-> The effect of centrifugal force is the push vehicle of 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 rising of outer bank over the inner one is known as Superelevation.

⇒ Mathematically :->



- W = weight of vehicle
- P = centrifugal force
- v = speed of vehicle (km/sec)
- g = Acceleration due to gravity.

$(P - T = 0) \Rightarrow$

$R =$ Radius of Curve. (3)

$h =$ Super elevation in m

$b =$ width of road in m

$G =$ Distance b/w centre of rails.

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

As we know that

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

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

θ is the inclination of road surface, the inclination of resultant to vertical is also θ .

So we have

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

$$(P - T - 0) \Rightarrow$$

⇒ On Roads :->

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

⇒ On Railway :->

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

⇒ Radius :->

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

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

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

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

⇒ Speed of vehicle :->

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

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

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

(For Roads)

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

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

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

(For Railway)



Q No # 2 :- →

(5)

Answer :- Trilaterations :-

- In trilateration Azimuth of initial line is measured.
- In trilateration all sides of triangle are measured.
- In trilateration it is possible to measure the distance without intervisibility.
- There are less internal check in trilateration as compare to triangulation.
- Trilateration relies on signal strengths.

⇒ Triangulation :-

- In triangulation the base line of triangle is measured.
- In triangulation all angles of triangle are measured.
- In triangulation intervisibility b/w station is essential.
- There are more internal checks in triangulation.
- Triangulation relies on fixing differences.

(P-T-O) ⇒

⇒ Principle of Triangulation ⇒ ⑥

Some of principle of triangulation are given below.

In triangulation the three angles and one base line of each triangle are known.

The predetermined side of first known as stations.

The accumulation of error is to be minimized in length, subsidiary bases at suitable intervals are provided.

⇒ Principle of Trilateration ⇒

The principle are given below.

It is a way of control survey in which a network of triangles are present just like in triangulation.



Q No # 3: Part - a :->

(7)

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 activities like dredging, main 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 bridge dams harbours are planned.

⇒ (P-T-O)

⇒ Factors to be determined while conducting

Hydrographic Survey :->

Following are the factors which would be done while 8 doing and conducting hydrographic surveying.

- (a) - Survey Equipment.
- (b) - Issue to a designated unit.
- (c) - Preparation of a hydrographic survey specification (To include a review of existing data).
- (d) - Issue to a designated unit.
- (e) - Reconnaissance requirement.
- (f) - Resource allocation.
- (g) - Detailed survey planning.
- (h) - Plans for compilation and checking of data.

Q No #3: Part-B :->

9

Answer:->

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 in this to determine the configuration of the sub aqueous source.

⇒ Purpose of Sounding:->

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

→ In Hydrographical surveying sounding is the measurement of depth below the water surface.

→ In short the main purpose and objective of sounding the depth below the water surface.

(P - T - O) ⇒

⇒ Equipment: →

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- (1) Sounding boat.
- (2) sounding rods and poles
- (3) lead lines
- (4) Sounding Machine
- (5) Fathometer.

Q No # 4 Part - A :->

(11)

Answer :-> Aerial photogrammetry :->

In Aerial photogrammetry an air-craft with camera setup is used to take photographs from the air flying over the ground.

Photography :->

Procedure of Aerial

photography :->

- > Establishing control points.
 - > Flight plan and photography
 - > photo interpretation and stereoscopy.
 - > parallax and measurement of parallax.
 - > Construction of map and Cartography.
- So photogrammetry is the science and technology of obtaining spectral measurement and other geometrically reliable procedure from photographs. (p-T-O) =>

Principle Applications →

(12)

is to determine the spatial position of the natural and man made features situated on the earth surface.

Purpose of using it / why we use it →

Photogrammetry is also used for measuring ~~parts~~ tools in architectural studies of structures accident investigation, medication there operation are referred to as non topographic application.

x ————— x

Q no #4: Part - B :->

(13)

Answer:-> Procedure of Aerial

Photogrammetry:->

- > Establish Control points.
- > Flight planning and photography.
- > photo interpretation and stereoscopy
- > parallax and measurement of parallax.
- > Construction of map and Cartography.

(a) Establish Control points:->

These points are boundaries for selected ground.

(b) Flight planning and photography:->

It is the time of decision about height which is to be maintained while while take photographs.

Area covered in photographs numbers of photographs etc.

Photo interpretation and stereoscopy:->

Interpretation is done by stereoscopy which contain photo magnification for observing dimensional model of area so we can draw maps.

(P-T-O) =>

⇒ Parallax and measurement

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14

Parallax :->

Its an error, its the displacement of objectives in maps.

⇒ Construction of map :->

After collecting all photographs we can create or plot maps.

x ——— x ——— x ——— x
The En.