ID 7962

Section B

Dep Be (CIVIL)

Paper Adv engineering surveying

Q No 1

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 or reverse curve.

Types

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

(i) cubic parabola (railways)

(ii) clothoid or spiral (railways)

(iii) lemniscal (Highways)

superelevation

Q1, P2

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.

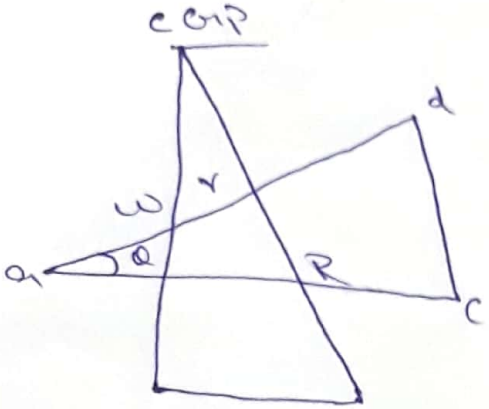
(1) weight of vehicle.

(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 otherwords 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 (m/sec)

g = acceleration due to gravity.

R = radius of curve

h = super elevation in m

b = width of road in m

G = Distance between 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:

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

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

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

So we have

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

On Roads

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

on Railways

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

Radius

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

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

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

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

Speed of vehicle

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

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

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

(For roads)

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

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

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

(for railways)

Triangulation Q2

It consists of a number of interconnected triangle in which the lenght of only one base line and the angle of the triagles are measured very precise which are used to calculate the coordinates of vertical.

Principle of triangulation.

★ If all the three angles and the lenght of one side of a triangle are known then by trigonometry the lenghts of the remaing side of the triangle can be calculated.

★ Again if the coordinates of any vertex of

the triangle and azimuth of any side are also known the coordinates of the remaining vertices may be computed

Trileteration

* Lenght measure

All sides - angle computed by ~~cos~~ cosine rule.

* Method in which the lenght of all side of chain of triangles polygons or quadrilaterals are measured with an electronic instrument or other the angle then may be computed from these field measured.

In contrast to triangulation it does involve the measured of angle in a field

Trilateration has same purpose as triangulation.

Principle

All the three side of each triangle are measured in the field with the distance measuring ~~tht~~ Instrument.

* Horizontal angle are not measured in field.
* Angle in a trilateration systems are computed indirectly from the lengths of the side of triangle by cosine formula.
* vertical angle are also measured where elevation have not been establish.

Difference

Triangulation.

(*) All angle are measured in triangulation.

Q2
P4

(A) Distance of baseline is measured.

* Some check base lines are also measured to controle scale error.

* Intervisibility between stations is essential.

* There are more internal checks in comparition with trilateration in the same geometric figure.

Trilateration

* All sides are measured in trilateration.

* Azimuth of the initial line is measured.

* Some check angle are measured to control azimuth error.

* For small ~~areas~~ areas it is possible to measure distance without intervisibility.

Q No 3 (part - a)

Hydrographic survey

Hydrographic surveying or bathymetric surveying is the survey of physical features present under water. It is science of measuring all factors beneth water that affect all the marine activities like dredging, marine construction offshore drilling ect.

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

Q3 Part A P(2)

Why we do Hydrographic Surveying.

=> Depth of bed can be determined.

=> Shore lines can be determined.

=> Tide measurment

=> locating mean sea level.

=> River and stream discharge measurment

=> Massive structure like bridges dams harbors are Planned.

=> **Factors to be determined while conducting Hydrographic Survey.**

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

=> Survey equipment.

Q3 part a P(3)

=> Issue to a designated unit

=> Programmer Planning of that unit.

=> assessment of the task with in their unit.

=> ~~Re~~ Resource allocation

=> Detailed survey Planning

=> Plans for compilation and checking of data.

Q3 Part B

Q3 P1

Sounding

⇒ The process of determining depths below the water surface is called sounding.

⇒ Sounding is analogous to levelling on land.

⇒ The reduced level of any point on the bottom of a water body is obtained by subtracting the sounding from the mean sea level.

Purpose of sounding.

⇒ Preparation of accurate charts for navigation.

2) Determination of the quantities of the material to be filled.

3) Obtaining information for design

of breakwaters sea walls etc

Equipment for sounding Name

(1) Shore signals and buoys

(2) Sounding equipment

(3) Angle measuring Instruments

Shore Signal and buoys.

(1) Shore signal ~~and~~ are required to mark range line.

(2) The signals are usually wooden tripods with a white and coloured flag on the top.

(3) In deep waters, the range lines are marked by a signal at shore and buoys in water.

Q3
P1
8

Sounding equipment

⇒ The sounding operation is carried out from a flat bottom boat of low draft

⇒ The boats are generally provided with opening called wells through which sounding are taken.

Angle measuring equipment

1) Index glass
2) Index Arm
3) Horizon glass
4) veniers
5) ~~Clamp~~ clamp
6) Pin-hole plates.

Question = 4

Part = A

Aerial Photogrammetry is the branch of surveying that deals with production of maps such as Plainmetic or topographic maps by comping number of photographs taken in that area.

Why do it.

2) The use of aerial photograph for military purposes was expanded during world war I by aviators.

3) Aerial Photography is used in

cartography land use planning archeology, movie production environmental studies espionage, commercial advertising conveyancing and other. fields.

Types

(i) Terrestrial Photogrammetry
(ii) Aerial Photogrammetry

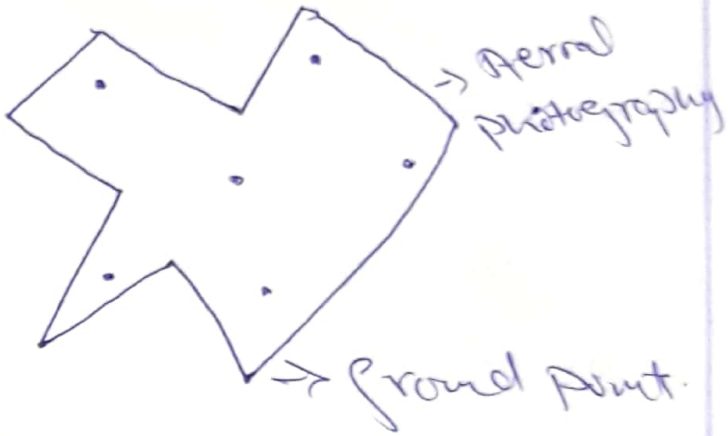
Terms used in areal photography

=> Exposure Station
=> Flying height
=> Tilt
=> swing
=> Altitude.

Q No 4 Part B

Procedure of aerial photography

=> Establishing central points.
=> Flight planning and photography
=> Photo interpretation and stereoscopy
=> parallex and measurment of parallex.
=> construction of map and cartography.
=> These should be maximum of 3 to 4 central points are need in one photograph. The establishment of central points depends upon the scale of map, flight central and cartographical method of mapping.



Ground Points

a) Area to be surved.

b) Focal ~~length~~ ~~length~~ length of Camera.

c) overlap.