

Name

ADIL AYAZ

I. D

7889

Section

A

Subject

Advance Engineering Survey

Date ~~24-6~~

24-6-2020

Question NO 3

15. Transition Curve:

A Curve of ~~var~~ 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.

type:-

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

- (i) Cubic parabola (railways)
- (ii) clothoid or spiral (railways)
- (iii) Lemniscate (Highway).

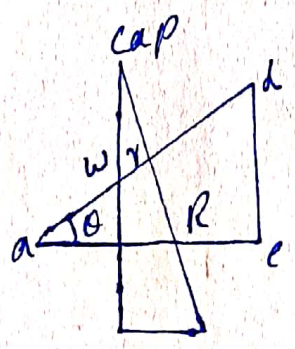
Superelevation It is amount by which the outer edge of a curve on a road or railway is banked above the inner edge when a vehicle passes to a curved path. The following forces acts on it.

Weight of vehicle
Centrifugal force both acting through
Centre of gravity of vehicle.

The effect of ~~Centrifig~~ Centrifugal force
is the path the vehicle off the track.

Now the ~~Contract~~ 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



- 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 radius.

4

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

As we know that

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

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

If θ is the inclination of road
surface, the inclination of resultant
the vertical is above θ
so we have

$$\tan \theta = \frac{d_c}{a_c} = \frac{P}{W} = \frac{bv^2}{gR}$$

on Roads:

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

on Railway =

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

Radius \perp

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

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

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

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

Speed of vehicle:

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

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

$$v = \sqrt{b \tan \theta g R}$$

(for roads)

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

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

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

(for railway).

6 Question No 2.

ANSWER:-

Triangulation:-

- (1) All angles are measured in triangulation.
- (2) Distance of baseline is measured
- (3) Some check baselines are also measured to control scale error.
- (4) Intervisibility between stations is essential
- (5) There are more internal checks in comparison with triangulation in the same geometric figure
- (6) The side lengths are computed on the basis of measured angles applying sine law

Trilateration:-

- (1) All sides are measured in trilateration
- (2) Azimuth of the initial line is measured
- (3) Some check angles are measured to control azimuth error

7

- (4) For small areas it is possible to measure distances without intervisibility
- (5) There are less internal checks in comparison with triangulation in the same geometric figure
- (6) The angles are computed on the basis of measured side lengths applying cosine law.

principle of trilateration:

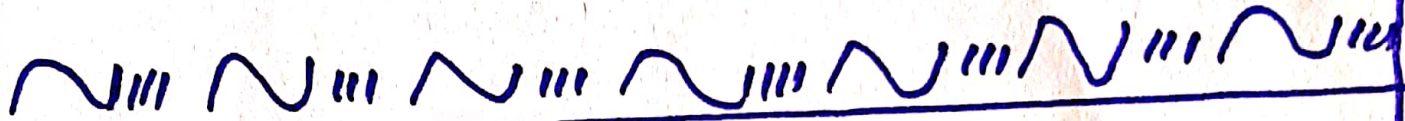
- (i) trilateration are highly accurate and precise method of establishing and expanding horizontal control
- (ii) Method of control survey in which a network of triangle is used in a triangulation system.
- (iii) All the three sides of each triangle are measured in the field with the distance measuring instrument (EDMs, tapes, other apparatus).

- (iv) Horizontal angles are not measured in the field.
- (v) Angles in a trilateration system are computed indirectly from the lengths of the sides of triangle by cosine formula.
- (vi) Few horizontal angles are also sometimes measured to provide a check on computed angles.
- (vii) Trilateration is adjusted after the computation of the angles and then coordinates of the stations are determined.
- (viii) Vertical angles are also measured where elevations have not been established.

(i) principle of triangulation \Rightarrow
 if all three angles and length of one side of a triangle are known. then by trigonometry the length of the remaining sides of the triangle can be ~~also~~ calculated.

9

(iii) Again, if the coordinates of any vertex of the triangle and azimuth of any side are also known, then coordinates of the remaining vertices may be computed



Question No 3

part (a)

ANSWER:

Hydrographic Surveying

definition it is the branch of surveying which is deals with water bodies
e.g. lake, river etc.

Q The usual fundamental principles of surveying and ~~levelling~~ levelling are adopted for acquiring data for determination of:

(i) water volume

(ii) Rate of flow

(iii) To determine the shape of the area underlying the water surface etc.

Why we do it?

⇒ Because hydrographic surveying or bathymetric surveying is the survey of physical features present under water. it is the science

of measuring all the ^{factors} ~~marine~~ & beneath water that effect all the marine activities like dredging, marine construction offshore drilling etc. hydrographic surveying is mainly conducted under authority concerns. it is sounding or electronic sensor system for shallow water.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★

part b

ANSWER:-

Sounding:-

defn The process of determining depth ~~of~~ below the water ~~sound~~ surface is called sounding. sounding is analogous to levelling on land.

(2) a

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

- (i) preparation of accurate charts for navigation
- (ii) Determination of quantities of the material to be filled.
- (iii) Obtaining information for design of breakwaters, sea walls etc.

Naming of equipment:

The essential equipment and instrument employed for taking the sounding may be grouped as:

- (i) Shore signals and buoys.
- (ii) Sounding equipment.
- (iii) Angle measuring instruments.
- (iv) (1) sounding boat (2) sounding rod and pole (3) Leadline (4) sounding machine (5) fathometer



13

Question No 4 part "a"

swen

Aerial photogrammetry:-
photo means "picture" Grammetry means "measurement"
Aerial photography is taking of photographs
from an aircraft or other flying object.
platforms for aerial photography include
fixed-wing aircraft, helicopter, unmanned
aerial vehicles, balloons, blimps and
dirigibles and vehicle-mounted poles

why we do it?
because aerial surveying is normally
done using manned aeroplanes where
the sensors (camera, radars, lasers, detector, etc)
and the GNSS receiver are georeferencing
of the collected data.

Aerial Survey is a form of collection of
geographical information using airborne
vehicles. The collection of information can be
made using different technologies such
as aerial photography, radar, laser or from
remote sensing imagery using other
bands of the electromagnetic spectrum

Such as Infrared rays, gamma rays ¹⁴ or ultraviolet for information collected to be useful this information need to be geo referenced the geo referenced of information is usually done using GNSS with similar techniques is the techniques used for dynamic land surveying.



part "b"

procedure of aerial photography

- (i) Establishing control points.
- (ii) Flight planning and photography
- (iii) photo interpretation and stereoscopy.
- (iv) parallex and measurement of parallex.
- (v) Construction of map and Cartography.

THE END :-)