

NAME

ASAD-ullah

Section

B

ID

7938'

Paper

Advance Eng.  
Survey.

## 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 reverse curve.

### Types :-

- ✓ Cubic parabola
- ✓ clothoid or spirall
- ✓ Lemniscate

### Superelevation :-

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 comes to a curved path. The following force acts on it.

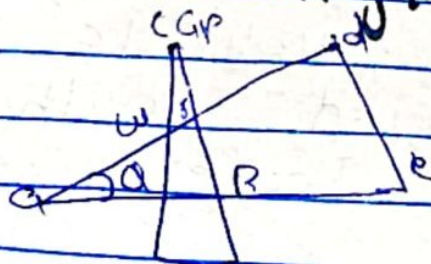
- (i) Weight of vehicle  
 (ii) centrifugal force both acting through center of gravity of vehicle

### ⇒ Effects

The effects of centrifugal force is to push vehicle off the track now to counteract the the plane of the road surface is made perpendicular to resultant of centrifugal force & 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.

Mathematically:-



$w =$  weight of vehicle  
 $P =$  centrifugal force  
 $v =$  speed of vehicle  
 $g =$  acceleration due to gravity  
 $R =$  radius of curve  
 $h =$  Supper elevation  
 $b =$  width of road  
 $G =$  distance between center of road.

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  $\theta$  is inclination of road surface  
 the inclination of

So resultant is also  
vertical  
We have

$$\tan \theta = \frac{dc}{ac}$$

on Road  $s =$

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

on Railways

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

Radius

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

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

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

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

$\Rightarrow$  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 road)

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

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

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

For railways,

## Question (2)

### Triangulation :-

it consists of a number of interconnected triangles in which the ~~angle~~ length of only one base line and the angle of the triangles are measured very precise which are used to calculate the coordinates of vertices.

### => Principle of Triangulation

\* if all the three angles and the length of one side of a triangle are known then by trigonometry the lengths of the remaining side of the triangle can be calculated.

\* Again if the coordinates of any vertex of the triangle & azimuth of any side are also

known the coordinates  
of the remaining  
vertices @ may be  
computed.

### Trilateration:-

measure all sides - angle  
computed by cosine rule  
\* Method in which the  
length of all side of  
chain of triangle polygons  
or quadrilaterals are  
measured with an  
electronic instrument or other  
the angles 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



each triangle are measured in the field with the distance measuring instruments.

\* Horizontal angle are not measured in field.

Angle in a triangulation systems are computed indirectly from the lengths of the side of triangle by Cosine Formula.

\* Few horizontal angle are also sometime measured to provide a check on computed angle.

\* Vertical angle are also measured where elevation have not been establish.

∴ difference:

Triangulation :-

All angle are measured in triangulation.

- (2) Distance of baseline is measured
- (3) Some check base lines are also measured to control scale error
- 4 Intervisibility between stations is essential
- (5) There are more internal checks in comparisons with ~~trilateration~~ trilateration in the same geometric figure.

Trilateration :-

All side are measured in trilateration.

- \* Azimuth of initial line is measured
- \* Some check angles are measured to control azimuth error
- \* For small area it is possible to measure distance without intervisibility.

## Question 3:-

### Part A :-

#### Hydrographic Survey :-

It is a survey of physical feature present under water. It is science of measuring all factors beneath water that affects all the marine activities like dredging, Marine construction off shore, drilling etc.

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

#### Why we do Hydrographic Surveying :-

In order to get  
Flowing information  
we do Hydrographic  
surveying

(i) Depth of bed can  
be determined

(ii) Shore lines can be  
determined

(iii) lowing mean sea  
level

(iv) Tide measurement.

(v) River and stream  
discharge measurement

**Factors To be determine  
while conducting Hydro  
graphic Survey:-**

(i) Surveying Equipment

✓ preparation of a  
Hydrographic Survey  
specification

✓ Issue to a  
designated unit

✓ programmer planning  
of that unit

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Date: / /

- ✓ Assessment of the task with in that unit
- ✓ Reconnaissance requirement
- ✓ Resource allocation

These are the Flowing Factor which will be done while doing and conducting hydrographic surveying

## Question (3) part (B)

### Sounding:-

The process of determining depths below water surface is called Sounding. Sounding is analogous to leveling on land.

The reduced level of any point on the bottom of water body obtained by subtracting the Sounding from the mean sea level.

### Purpose For Sounding

- (i) preparation of accurate charts for navigation
- (ii) determine ~~of~~ quantities of the material to be filled
- (iii) obtained information for design of breakwater, sea wall etc.

### → Name of

- (i) Shore Signals and buoys
- (ii) Sounding equipment

Angle measuring instrument:-

## Shore Signal and buoys

- (i) It is required to mark danger lines
- (ii) Each range line is marked with two signals at some distance apart along it on each shore.
- (iii) The signals are usually wooden tripods with white and coloured flag on the top.

## ⇒ Sounding Equipment

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

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

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

## Types:-

- i) Terrestrial photogrammetry-
- ii) Aerial photogrammetry-

## Terms used in aerial photography.

- ⇒ Exposure station-
- ⇒ Flying height-
- ⇒ Altitude-
- ⇒ Tilt-
- ⇒ Swing-



Q No # 4:

Part A:

Aerial. Photogrammetry:

Aerial Photography is the branch of surveying that deals with production of maps such as Planimetric or topographic maps by comparing number of photographs taken in that area.

OR.

Aerial photography is the taking of photographs from above with a camera on an aircraft, helicopter, balloon, rocket skydiver or similar vehicle.

## Why do it:-

The use of aerial photograph for military purpose was expanded during world war 'I' by aviators

⇒ Aerial photography is used in cartography, land use planning, Archeology, movie production, environment studies espionage, commercial advertising conveyancing and other field.

## Terms used in aerial photographs:-

- ⇒ Exposure station
- ⇒ Flying height
- ⇒ Altitude
- ⇒ Tilt
- ⇒ Swing

# Procedure of aerial photography:

(i) Establishing central point.

(ii) Flight planing and photography.

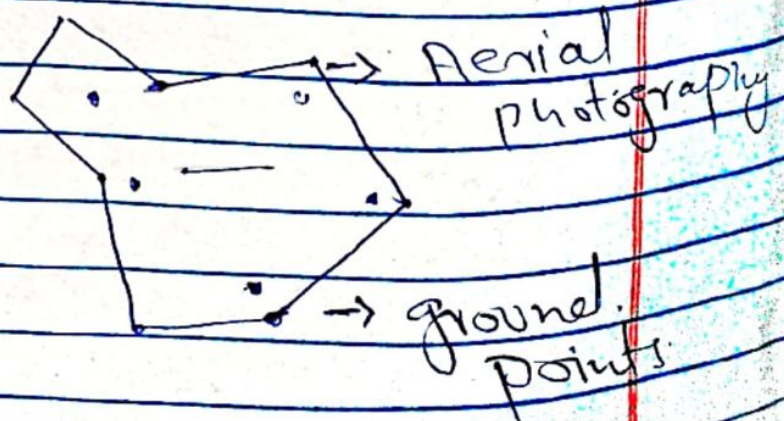
(iii) photo interpretation & stereoscopy.

⇒ Parallax and measurement of parallax.

⇒ construction of map & cartography.

These should be minimum of 3 to 4 central points are need in one photograph.

The establishment of central points depends upon the scale at map, flight central and cartographical method of mapping.



# Ground flat:

- ⇒ Area to solve.
- ⇒ Focal length of camera
- ⇒ overlap