

Name: KHUSHAL KHAN

Section: B

ID: 7505

Subject: Advance Survey & leveling

Submitted to: Engg Farhan Khattak

Transition Curve:

A curve of varying radius is called transition curve b/w tangent and circular curve. It is also known as spiral curve. It can be inserted in b/w branches. compound or reverse curve.

There are 3 types of transition curve.

- ① Cubic parabola \rightarrow for railways
- ② Spiral \rightarrow for railways.
- ③ Lemniscate \rightarrow for highways.

How superelevation is effected by speed of vehicle and radius:

Superelevation is affected by two things

- ① Weight of vehicle.
- ② Centrifugal force

The effect of centrifugal is ~~the~~ 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. In other words the outer bank of road is raised above the inner one.

Mathematically.

②

As we know that

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

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

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 Railway: $b \tan \theta = \frac{Qv^2}{gR}$.

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

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

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

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

③

Speed of vehicle:

(3)

For Roads:

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

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

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

For Railways:

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

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

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

Q2: What is the difference b/w Triangulation and Trilateration.

TRIANGULATION:

- ⇒ All angles are measured in triangulation
- ⇒ Distance of baseline is measured.
- ⇒ Some check base line are also measured to control scale error.
- ⇒ Intervisibility b/w stations is essential
- ⇒ There are more internal checks in comparison with trilateration in the same geometric figure.
- ⇒ The side lengths are computed on the basis of measured angles applying sine law.

TRILATERATION:

- ⇒ All sides are measured in trilateration
- ⇒ Azimuth of the initial line is measured
- ⇒ Some check angles are measured to control azimuth error.
- ⇒ For small areas it is possible to measure distance without intervisibility

There are less internal checks in comparison with triangulation in the same geometric figure

The angles are computed on the basis of measured side length applying cosine law.

Principles of triangulation:

- If all three angles and the length of one side of the triangle are known, then by trigonometry the length of the remaining 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, then coordinates of the remaining vertices may be computed.

Principles of Trilateration:

- Trilateration is highly accurate and precise method of establishing and expanding horizontal control.
- Method of control survey in which a network of triangles is used as in triangulation system.
- All three sides of each triangle are measured in the field with the distance measuring instruments.

Horizontal angles are not measured in the field.

Angles in this system are computed indirectly from the lengths of sides of triangle by cosine formula.

Few horizontal angles are measured sometimes measured to provide a check on computed angles.

Vertical angles are also measured where elevation have not been established.

Q3: (a)

Hydrographic Survey:

(7)

Hydrographic surveying is the survey of physical features present underwater. It is the science of measuring all factors beneath water that affect all the main activities like marine construction, offshore drilling.

Why we do it:

1. To Determine depth of bed.
2. Shore line can be determined
3. Locating mean sea level.
4. Tide measurement.
5. River & Stream discharge measurement.
6. Massive structures like bridge, dams, harbours are planned.

Factors to be determined while conducting hydrographic survey:

Following are the factors to be determined while conducting survey.

1. Survey Equipment
2. Proportions of hydrographic survey specification

- 3: Issue to be designated unit
- 4: Programme planning of that unit
- 5: Assessment of the task within that unit
- 6: Resource allocation.
- 7: Detailed Survey Planning
- 8: Plans for compilation and checking of data.

Q3: (b): Sounding: The measurement of depth below 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.

Purpose of Sounding:

- ⇒ Sounding is most important for any water body to improve its navigable properties to know about sitting and scouring.
- ⇒ In hydrographic surveying, sounding is the measurement of depth below the water surface.
- ⇒ In short the main purpose and objective of sounding to measure and finding the

the depth below the water surface

Equipment:

- Sounding boat
- Sounding rods and poles
- lead lines
- Sounding machine
- Fathometer

Q4: What is aerial photogrammetry?
and why we do it?

Ans: In Aerial photogrammetry, an aircraft with camera setup is used to take photograph from the air flying over the ground.

• Why we do it:

A bird eye view can allow prospective to appreciate the size and scope of a building and the surrounding landscape which will draw their interest and encourage them to view the property in person. Aerial photogrammetry is also useful in showing land that is open for development to potential investor.

Q 4(b): Shortly explain the procedure of aerial photography. (2)

① Establishing control points:

Control points are points established on ground with known positions. The photograph captured is observed by setting these points as boundaries. So these should be established in such a way that they should be easily identifiable on photograph.

② Flight planning and photography.

Flight planning are nothing but knowing the height to be maintained by flight while taking photos, areas to be covered in each photograph. This planning depend upon following factors.

- ① Area to be surveyed
- ② Focal length of camera
- ③ Overlap
- ④ Scale of photo
- ⑤ Speed of aircraft

③ photo interpretation & stereoscopy:

It is done by the instrument called stereoscope which contains magnifiers.

So, one can observe 3 dimensional model of area through it and it is also ease the drawing of maps of photographed area. There are four types of stereoscope used for photo interpretation

- ① lens stereoscope.
- ② Mirror stereoscope.
- ③ Scanning mirror stereoscope.
- ④ Zoom stereoscope.

④ Parallax and Measurement of Parallax

An aerial photograph can be studied to get the location of an object by its coordinates in the photograph.

Parallax is nothing but a displacement of an object in the photograph when point of observation is shifted to another angle.

⑤ Construction of Map by Cartography.

After collecting all photographs, it's time to create or plot the map. There are several methods available to plot the detail of map and one of the methods is stereoscope method.

On this method, instrument will help to review the overlapped areas in 3 dimensional which helps to view the spatial model. Then the model is measured and orthographically projected as map.