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## Answer #04

### TRANSITION Curve :-

A curve of varying radius is known as transition curve between tangent and circular curve. It is also known as spiral curve. It can be inserted in between the two branches of a compound reverse curve.

### Types :-

There are three common types

- (i) Cubic Parabola (railway)
- (ii) Clothoid or Spiral (railway)
- (iii) Lemniscate (Highway)

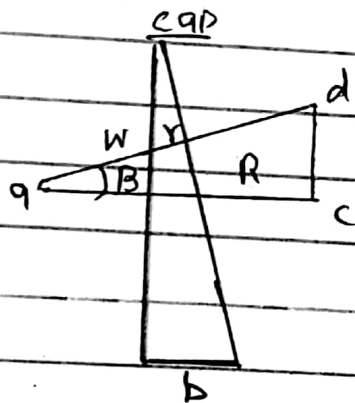
### Super elevation :-

It is the amount of which the outer edge of a curve on a road or railway is banked above the inner edge when a vehicle takes to a curved path the following forces act on it.

- (i) weight of vehicle.  
 (ii) Centrifugal force both acting through centre of gravity of vehicle.

In other words the outer bank of roads is raised above the inner one. This raising of outer bank over the inner one is known as Super elevation.

Mathematically



$$P = \frac{mv^2}{R} \quad W = mg$$

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

$$\tan \phi = \frac{a}{b} = \frac{dc}{ac} = \frac{P}{W}$$

$$\tan \phi = \frac{h}{b} = \frac{p}{w} = \frac{v^2}{gR}$$

$$h = b \tan \phi$$

$$h = \frac{bv^2}{gR} \rightarrow \text{on highway}$$

$$h = b \frac{Gv^2}{gR} \rightarrow \text{on railway}$$

where  $G$  = distance between centre of the rail.  
Super elevation is gradually applied along a transition curve. Full super elevation is attained in junction of the transition curve with the circular curve.

## Answer #02

Difference b/w Triangulation & Trilateration.

### Triangulation ::

- (1) All angles 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 station is essential.
- (5) There are more internal checks in comparison with trilateration in the same geometric.
- (6) The side length are computed on the basis of measured angles applying sine law.

### Trilateration ::

- (1) All side are measured in trilateration
- (2) Azimuth of the initial line is measured.
- (3) Some check analysis are measured to control azimuth error.
- (4) For small area its possible to measure distance without intervisibility
- (5) There are less internal checks in comparison with triangulation in the same geometric figure.

## Principle of triangulation:-

- (i) If the three angles and the length of one of a triangle are known then by trigonometry the length of the remaining sides of triangle can be calculated.
- (ii) 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 a highly accurate and precise method of establishing and expanding horizontal control.
- Method of control survey in which a network of triangles is used as a triangulation system.
- Horizontal angles are not measured in the field.
- Angle in trilateration system are computed indirectly from the length of the sides of triangle by cosine.
- Few horizontal angles are also sometimes measured to provide a check on computed angles.

### Answer # 3 (a)

#### Ans 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, marine construction, offshore drilling.

Hydrographic Surveying is mainly conducted under authority concern. It is mainly carried by means of sensor sounding or electronic sensor 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- Shave 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.

⇒ Factor to be determined while conducting Hydrograph survey ::

- (a) Survey Equipment
- (b) Preparation of a hydrographic survey specification
- (c) Issue to a designated unit.
- (d) Programme planning of that unit
- (e) Assessment of the taste within that unit.
- (f) Resource allocation
- (h) Detailed survey planning
- (i) Plans for completion and checking of data.

## Answer # 03 (b)

### 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 silt 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 find the depth below the water surface.

### Equipment ::

- ① Sounding boat
- ② Sounding rods and pales.
- ③ Lead lines
- ④ Sounding Machine
- ⑤ Fathometer.



## Answer # 4 (a)

### Aerial Photogrammetry:-

In terrestrial photogrammetry photographs are taken from a fixed position on ground while in the aerial photogrammetry an aircraft with camera setup is used to take photographs from the air flying over ground.

### Why we do it:-

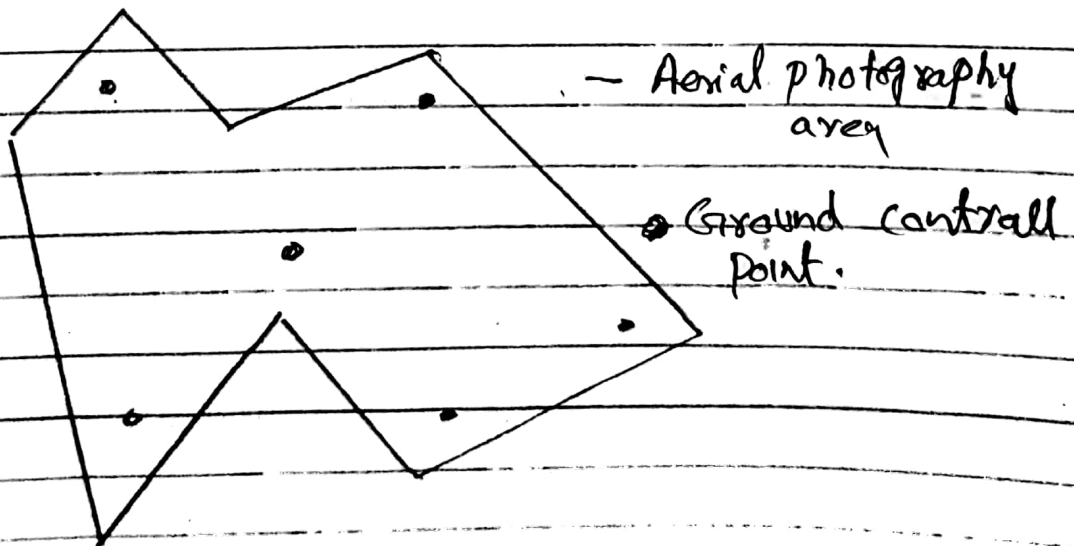
=> Because it is an important application of remote sensing with a sophisticated range of cameras being used to collect information on geology, land use, agricultural management, water, forestry,

## Answer #4 B

### Procedure of Aerial Photography

#### Establishing control Points:-

- There should be minimum of 3 to 4 control points are needed in one photograph.
- It depend on scale of map.
- Flight control and cartographic method of mapping.



## Parallax and Measurement of Parallax..

- > An aerial photograph can be studied to get the location of an object by its Co-ordinates in the photograph.
- > Similarly to know the third dimensional of some object. There should be minimum of two points of observation is needed from different angles.

## Construction of Map and Cartograph

After collecting photographs its time to create plot the map. There are several method available to plot the detail of map.

THE ENDS