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7966

SEC - B

AD. ENG. SURVEY

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CIVIL

SEM :- 4th

FINAL EXAM.

## QUESTION=01

**ANSWER:-**

### Transition curve:-

Curve of varying radius is called transition curve. It is also called spiral curve.

It is used in both highway & railway b/w tanget & circucar curve in order to have smooth transition from tangent to the tangent.

It is also inserted blw two branches of compound curve.

* ⇒ When vehical mouses from tangent on ↓ to the force acting on it are.

⇒ Weight of the vehicle

⇒ Gravity of the vehicle.

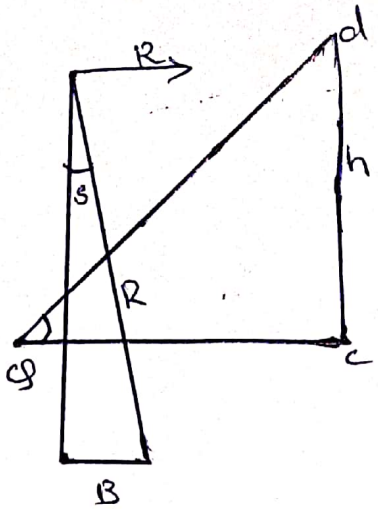
Let

W = weight of vehicle.
P = centrifugal force.
U = Space of vehicle, m/s
g = Acceleration due to gravity.
~~h = super~~
r = Radius of the curve.
h = super elevation.
b = width of the force.

for equilibrium the resultant R of the P & W must be equal & opposite to the reaction perpendicular to the road or real surface.

$$P = \frac{m^2}{R} = \frac{WU^2}{gR} \qquad W = mg$$

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




$$\tan\theta = \frac{h}{b} = \frac{dc}{ac} = \frac{P}{W}$$

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

$$h = b\tan\theta$$

$h = \frac{bv^2}{gR}$ ⟶ on highway

$h = \frac{bGv^2}{gR}$ ⟶ on railway

when G = distance b/w center 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-

## Question # 04

**Answer:-**

| | Triangulation | Trilateration. |
|---|---|---|
| 1) | All the angles are measured in triangulation | All sides are measured in trilateration |
| 2) | Distance of base line is measured | Azimuth of the Initial line is measured |
| 3) | Some check base lines are also measured to control scale error. | Some check angles are measured to control azimuth error. |
| 4) | Intervisibility between stations is essential. | For small areas it is possible to measure distances without intervisibility. |
| 5) | There are more internal checks in comparison with trilateration in the same geometric figure. | There are less internal checks in comparison with triangulation in the same geomatric figure. |
| 6) | The side lengths are computed on the basis of measured angles applying sine law. | The angles are computed on the basis of measured side lengths applying cosine law. |

## Trilateration and its Principles:-

1) Trilateration is a highly accurate and precise method of establishing and expanding horizontal control.

2) Method of control survey in which a network of triangles is used as in triangulation system.

3) Horizontal angles are not measured in the field.

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

5) Angles in a trilateration system are computed indirectly from the lengths of the sides of triangle by cosine formula.

**Cosine rule**

$$a^2 = b^2 + c^2 - 2bc\cos A.$$

$$2bc\cos A = b^2 + c^2 - a^2$$

$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

$$A = \cos^{-1}\left[\frac{b^2 + c^2 - a^2}{2bc}\right]$$

## :-Triangulation and its Principles:-

In serveying, triangulation is the process of determinig the location of a point by measuring only angles to it from known points at either end of a fixed baseline, rather than measuring distance to the point directly as in trilateration.

## QUESTION:03

## PART=(A)

### Hydrographic surveying:

- It is the branch of surveying which deals with water bodies e.g. Lake, rivers etc.
- The usual fundamental principles of surveying and levelling are adopted for acquiring data for determination of:

1- Water volume.
2- Rate of flow.
3- To determine the shape of the area underlying the water surface etc.

### Purpose:

1- To determine the quantities of subaqueous excavations.
2- Measure areas subjects to scouring or silting in harbours or docks.
3- Locate rocks and other objects such as boys, lights etc to aide safe navigation.
4- To prepare navigation charts exhibiting the depths avaible for navigating.
5- Control floods, and to plan water supply & storage from rivers.
6- To develop water resources for power, irrigation & recreation.

## Some points to note:-

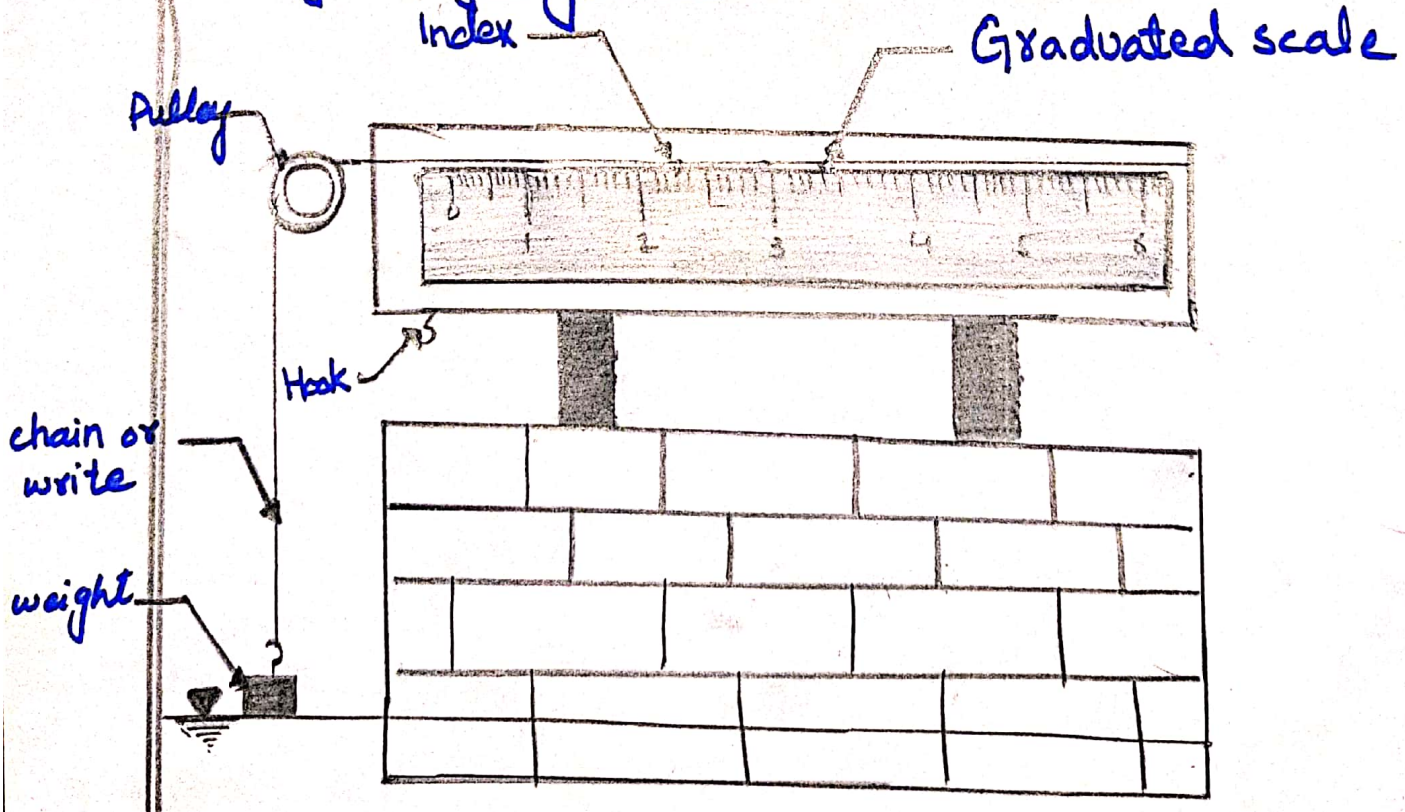
1- The measurement of depth of water at various points is termed as sounding.

2- Depth of sounding is referred to the water level at the time it it made.

3- Thereafter, the soundings are reduced to datum water level, to account for tidal water which undergo continual change of elevation, with the help of gauges.

4- A number of benchmarks (B.M) are established at frequent intervals along the shorelines, & gauges are set on them.

## c) Weight gauges:-



## Sounding:-

1- The process of determinig depths below the water surface is called sounding.

2- Sounding is analogous to travelling on land.

3- 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 for Sounding:-

1- Preperation of accurate charts for navigation.

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

3- Obtaining information for design of breakwaters, sea well etc.

## Sounding:-

1- The sounding points should be selected keeping in mind that all the important irregularities are recorded.

2- The soundings are thus made along a series of straight lines at right angles to the ~~shoreline~~ shoreline.

3- The spacing between the sounding lines & between the sounding points depends upon the nature of submarine surface as well as on the objects of the survey.

4- Usually spacing between sounding lines is kept 30m & spacing between sounding points is kept 7.5m or 15m.

## Equipment for sounding:-

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

1- Shore signals & ~~buoys~~ buoys.
2- Sounding equipments.
3- Angle measuring instruments.

## Question = 04

## Answer.

### :-Aerial Photogrammetry:-

In terrestrial photogrammetry photographs are taken from a fixed position on ground while in the aerial photogrammetry, and aricraft camera setup is used to take photographs from the air flying over the ground. In this aritiele we will discuss about the aerial photography.

### :-Procedure of Aerial Photography:-

1- Establishing control points.
2- Flight planning and photography.
3- Photo interperation and stereocoscopy.
4- Parallax and measurement of ~~parallax~~ parallax.
5- Construction of map and cartography.

## :Establishing control Points:-

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

## :Flight Planning & Photograph:-

Flight planning is nothing but knowing the hieght to be maintained by flight while taking photos, area to be covered in each photograph, number of photographs, no of strips, and time interval b/n exposures. This planning mainly depends upon following factors.

- Area to be surveyed.
- Focal length of camera.
- Overlap.
- Scale of photograph.
- Ground speed of aircraft in still air.

There are some formulae are available for different parameters as follows.

## Altitude of Aircraft:-

It can be computed from.

Flying height H = contour interval x C.

Where C varies from 500-1500.

## Area covered by one photograph:-

Area covered by one photograph = (length x scale) x (width x scale)

## Number of photographs required:-

No. of photographs required to cover all the given area are = N1 x N2.

Where N1 = L1/((1-P1) S1) + 1 & N2 = B1/((1-Pw) Sw) + 1.

Where N1 = number of photographs in each strip.

N2 = number of strips.

L1 = length of photograph (in direction of flight)

L2 = width of photograph (perpendicular to the direction of flight).

P1 = longitudinal overlap

Pw = side overlap.

S1 = scale in length wise.

Sw = scale in width wise.

## :- Photo Interpretation & stereoscopy :-

Photo interpretation is done by the instrument called stereoscope which contains magnifiers. So, one can observe the three-dimensional model of area through it & it also ease the drawing of maps of photographed area. For accuracy, control stations, elevations, length of lines should be sufficiently available.

There are namely.

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

Lens & mirror stereoscopes are majorly used for photointerpretation. Apart from these, some characteristics should be maintained for good photo interpretation. The characteristics should be as follow.

1- Shape
2- Size
3- Pattern
4- Shadow
5- Texture
6- Site

## Shape:-

Shape is an important properly for an object in photograph. The outline or configuration will deliver the shape of an object. So, one can recognize the shape of an object in the map or photograph.

## Size:-

Size is also an important in photo interperation. The size should fixed to some scale and properly interpreted on the photograph. Then only observer can feel the difference between large objects and small objects. For example size of major rivers and drain should be interpreted in different sizes.