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Section : B

Subject : Advance Engineering
Survey

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①

Question No:- 1

Transition Curve:-

A curve of varying radius is called transition curve.

It is also called spiral curve.

It is used in both highway and railway between tangent and circular curve in order to have smooth transition from tangent to the curve and from curve to the tangent.

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It is also inserted between two branches of compound curve.

→ when vehicle moves from tangent on to the curve the forces acting on it.

→ weight of the vehicle

→ gravity of the vehicle.

Let

w = weight of vehicle

D = centrifugal force

v = speed of vehicle m/s

g = Acceleration due to gravity.

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R = Radius of the curve.

h = Super elevation.

b = width of the road.

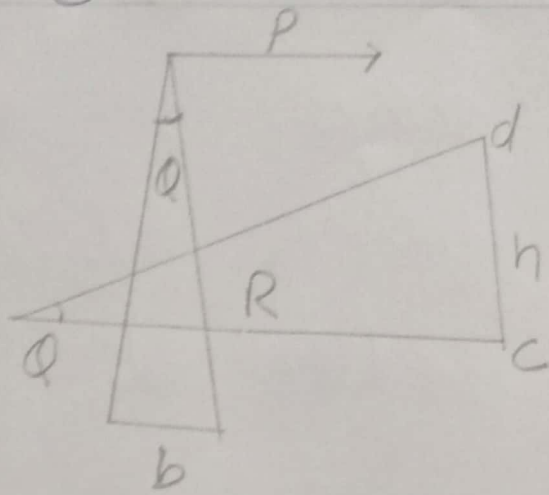
For equilibrium the resultant R of the P and w opposite to the reaction perpendicular to the road or said surface.

$$P = \frac{mv^2}{R} = \frac{mv^2}{gR} \quad ; w = mg$$

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

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

(4)



$$\tan \phi = \frac{h}{b} = \frac{dc}{ac} = \frac{P}{w}$$

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

$$h = b \tan \phi$$

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

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

Where $G =$ distance b/w
center of the sail.

(5)

→ Super elevation is gravity applied along a transition curve.

Full Super elevation is attained in Junction.

of the transition curve with the circular curve.

(6)

Question No. 2:

Difference between Triangulation
And Trilateration:

TRIANGULATION

① working with angles.

② Triangulation consist of number - interconnected triangle in which the length of only one base line and the angles of triangles are measured very precisely which are used to calculate the coordinates of vertices.

TRILATERATION

① working with distances.

② It is the method in which the lengths of all sides of a triangle, polygon etc are measured with an electronic instrument.

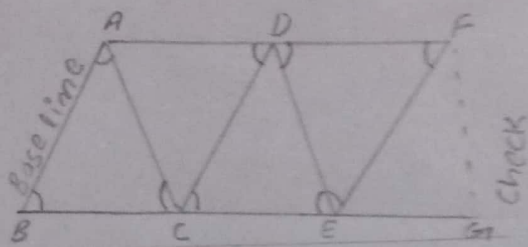
3)

The position of the point of the interest are computed based on measured angles and two known points.

From these angles the distance are computed which are in turn used to calculate co-ordinates from the target points.

4) This technique is mostly preferred by surveyors.

5) It is mostly used in hilly areas.



3)

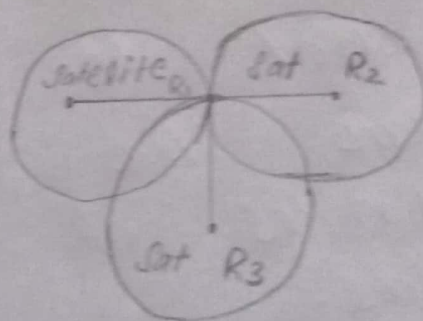
In trilateration you work with distances.

From those distances you compute the angles.

once the angles is computed you can use them in conjunction with the distance to get the position of the target points.

4) It is the most popular technique also used by G.P.S.

5)



b) Intervisibility between stations is essential.

b) For small areas it is possible to measure distances without intervisibility.

a) These use more internal checks in comparison with trilateration in the same geometric figure.

a) These use less internal checks in comparison with triangulation with the same geometric figure.

PRINCIPLES OF TRIANGULATION AND TRILATERATION.

Principles of Triangulation

→ If all three angles and the length of one side of the triangle are known then by trigonometry the lengths of the remaining sides of the triangle's can be calculated.

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→ Again if the co-ordinates of any vertex of the triangle and azimuth of any side are also known, then co-ordinates of the remaining sides (vertices) may be computed.

SINE Rule:-

$$\frac{a}{\sin(A)} = \frac{b}{\sin(B)} = \frac{c}{\sin(C)}$$

PRINCIPLES OF TRIANGULATION.

→ It is highly accurate and precise method.

→ All the three sides of each triangle are measured in the field with the distance measuring instruments.

→ Horizontal angles are not measured in the field.

→ Angle in a triangulation system are computed indirectly from the lengths of the sides of triangle by cosine formula.

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Q No 3 : 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

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30m and spacing between
pounding points is kept
7.5m to 15m

Purpose For Sounding

- ① Preparation of accurate charts for navigation.
- ② Determination of the quantities of the material to be filled.
- ③ Obtaining information for design of breakwaters, sea walls etc.

Q NO 3 :- Part B

Sounding:-

- ① The process of determining depths below the water surface is called sounding.
- ② Sounding is analogous to levelling 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.
- ④ The sounding points should

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be selected keeping in mind that all the important irregularities are recorded.

⑤ The soundings are thus made along a series of straight line at right angle to the shotline.

⑥ The spacing between the sounding lines and between the sounding points depends upon the nature of submarine surface as well as on the object of the survey.

⑦ usually spacing between sounding line is kept

the water surface etc.

PURPOSE:-

- To determine the quantities of subaqueous excavation.
- measure area subjected to scouring or silting in harbours or docks.
- locate rocks and other object such as buoys, lights, etc to aid safe navigation.
- To prepare navigation charts exhibiting the depths available for navigation.
- control flood, and to

(5)
Plan water supply and
storage from river.

→ To develop water
resources for power,
irrigation and reclamation.

Some points to note:-

→ The measurement of depth
of water various points
is termed as sounding.

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

→ These after, the soundings
are reduced to datum
water level, to account
for tidal water which
undergo continual change
of elevation, with the help of gauges.

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

Q No: 4 :- Part A

ARIEL Photogrammetry:-

Aerial photogrammetry is the branch of surveying that deals with the production of maps such as topographic maps. by compiling number of photographs taken in that area.

→ In aerial photogrammetry an aircraft with camera setup is used to take photographs from the air flying over the ground.

while on the other hand terrestrial photo-grammetry photographs are taken from the fixed points on ground.

→ Platform for aerial photography include fixed wings aircraft, unmanned aerial vehicles Pigeons, kites etc.

→ Aerial photography should not be confused with air to air photography where one or more air-crafts are used.

→ It is the technique of photographing the earth surface.

→ some time land surveying is difficult. this difficulty is resolved by using VAVS.

→ This can also be used in the areas where disaster is happened.

Why Do we Do it :-

→ Aerial Photogrammetry is done because in many cases it is difficult for us to cover the whole area. Like in.

→ In Industry :-

people often employ drones and other UAVS to capture photography from the air compared to the other techniques it can be more ~~difficult~~ efficient to the larger areas and it would be impossible for them to attempt it directly.

Q No: 4 :- Part B

Procedure of aerial photography:-

- Establishing control points.
- Flight planning and photography.
- Photo-interpolation and stereo-scopy.
- ~~Parallax~~ and measurement of parallax.
- construction of MAP and cartography.

(2)

Flight Planning And Photography:-

Flight Planning is nothing but knowing the height to be maintained by flight while taking photos.

Attitude of Aircraft:-

It can be computed from flying height $H = \text{contour interval} \times c$
where c varies from 500-1500.

Area covered by one Photography:-

Area covered by one
photography = (length \times scale) \times (width \times scale)

Number of Photography
Required :-

Number of Photo-
graphy required to cover
all given area = $N_1 \times N_2$

Photo Interpretation
And Stereoscopy :-

Photo interpretation
is done by instrument
called Stereoscope which contains
magnifiers, so one can
observe the three dimensional
model of area through it
For accuracy control station
elevation, length of lines
should be sufficiently available.