

Sec A

Date: / / 20

ID # 7549

Summer 2020

Q no 1

Given data

$$\text{Angle } \angle KMN = 130^\circ$$

$$\text{Angle } \angle KMC = 140^\circ$$

$$\text{Radius of 1st Arc} = 7549 - 300 = 7249 \text{ m}$$

$$\text{Radius of 2nd Arc} = 7549 - 200 = 7349 \text{ m}$$

$$\text{Intersection point} = 7549 - 400 = 7149 \text{ m}$$

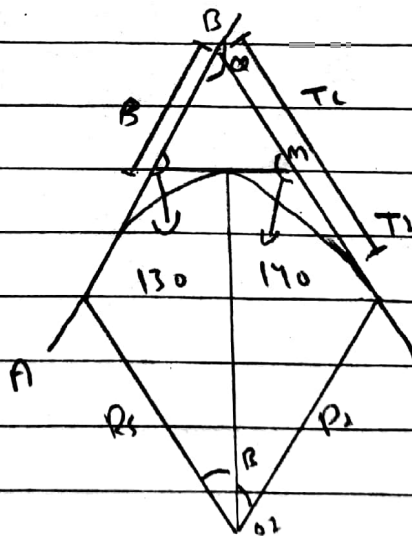
Solution

$$\alpha = 180 - 130 = 50^\circ$$

$$\beta = 180 - 140 = 40^\circ$$

$$\phi = \alpha + \beta = 50 + 40 = 90^\circ$$

$$I = 180 - 90 = 90^\circ$$



$$KN = KM = R_1 \tan\left(\frac{\alpha}{2}\right) = 7549 \tan\left(\frac{50^\circ}{2}\right) = 3520.1 \text{ m}$$

$$MN = MT_2 = R_2 \tan\left(\frac{\beta}{2}\right) = 7549 \tan\left(\frac{40^\circ}{2}\right) = 2747.6 \text{ m}$$

$$\star KN = KM = KN + MN = 3520.1 + 2747.6 = 6267.7$$

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\Rightarrow BIC and BM by Sin Rule

$$\Rightarrow BIC = \frac{M1K \sin B}{\sin 1} = \frac{6267.7 \cdot \sin(40^\circ)}{\sin(90^\circ)}$$

$$BIC = 4028.7 \text{ m}$$

$$\Rightarrow BM = \frac{M1K \sin d}{\sin(L)} = \frac{6267.7 \times \sin\left(\frac{90^\circ}{2}\right)}{\sin(90^\circ)}$$

$$BM = 2648.8 \text{ m}$$

$$\Rightarrow T_2 = K T_1 + BIC = 3520.1 + 4028.7 = 7548.8$$

$$\Rightarrow T_1 = M T_1 + BM = 2747.6 + 2635 = 5382.6$$

$$L_1 = \frac{\pi R_1 \alpha}{180^\circ} = \frac{3.14 \times \overset{7249}{\cancel{3520.1}} \times 50}{180} = \cancel{307.3}$$

$$L_2 = \cancel{307.3} \text{ m } 6322.7 \text{ m}$$

$$L_5 = \frac{\pi R_5 \alpha}{180} = \frac{3.14 \times 7349 \times 40}{180}$$

$$L_5 = 5727.9 \text{ m}$$

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As we have intersection point is
7149m

$$\begin{aligned} \text{Now P.I.} - T_2 &= 7149 - 7548.8 \\ &= -399.8 \text{ m} \end{aligned}$$

Changry at $T_1 = 7188.69 \text{ m}$

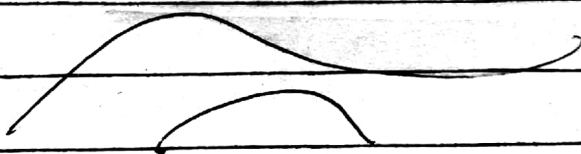
$$\begin{aligned} \text{Changry of } T_1 + L &= 7188.62 + 6322.7 \\ &= 13511.32 \text{ m} \end{aligned}$$

Now Changry A Pound Curve

$$= 13571 + 5127.9$$

$$= 18638.9 \text{ m}$$

Changry of $T_2 = 8642.63 \text{ m}$

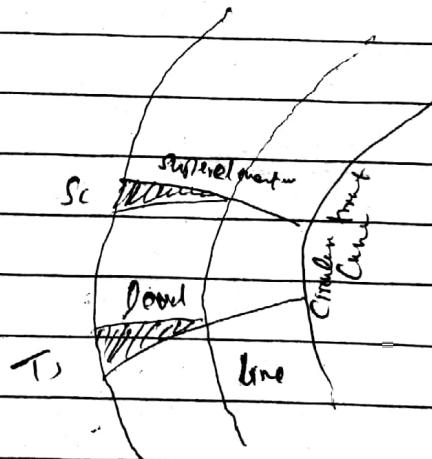


Q no 2

Transition Curve:

A curve of varying radius is called transition curve it is also called spiral curve or easement curve

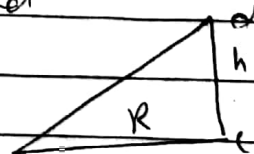
⇒ It is used on both highway & railway between tangent and circle curve in order to have smooth transition from tangent to be curve and from curve to the tangent

Super elevation

Let $V =$ Speed of vehicle m/s

$g =$ Acceleration due to gravity m/s^2

$b =$ width of road



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When vehical move from tangent on the the Curve the Force acting on the are

- Weight of vehicle
- Centrifigle Force both acting through the center of gravity of the vehicle

Q) Centre act the action the outer rail or act edge of the road raised above the railway of water adge of rail road above the inner one is called Super elevation

The amount of Super elevation depend upon

- speed of vehicle
- Radtus of Curve

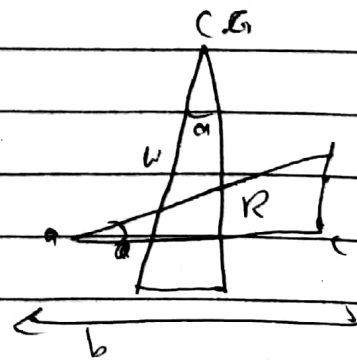
$$P = \frac{mv^2}{R} = \frac{WR^2}{gR} \quad \therefore W = mg$$

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

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

$$\tan \alpha = \frac{h}{b} = \frac{P}{W} = \frac{v^2}{gR}$$

$$h = b \tan \alpha$$



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$$h = b \tan \theta$$

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

$$h = b \frac{G v^2}{g r} \rightarrow \text{on railway}$$

where G = Distance b/w the center of rail

Super elevation is gradually applied along a transition curve full super elevation attend at junction of the transition curve circular curve.

Q 170 3

VS

Triangulation

Trilateration

1. All angle are measured in triangulation.

1. All side are measured in trilateration

2. Some check base lines are also measured to control scale error

2. Some check angles are measured to control azimuth error

3. Distance of baseline is measured

3. Azimuth of the initial line is measured

4. Inter visibility between station is essential

4. For small areas it is possible to measure distance without intervisibility

5. there are more internal check in comparison with trilateration in the same geometric figure

5. there are less internal checks in comparison with triangulation in the same geometric figure.

6. The side length are computed on the basis of measured angle applying sine law

6. The angle are computed on the basis of measured side lengths applying cosine law

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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 sides 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.

Trilateration Principle:-

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

* method of Control Survey in which a network of triangle is used as in triangulation system.

* All the three sides ~~are~~ of each triangle are measured in the field with the distance measuring instruments (EDM, tapes other apparatus).

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

Q no 4 (12)

Hydrographic Survey:

* It is the branch of Surveying which deals with water bodies e.g. lake river.

* The usual fundamental principle of Surveying and leveling 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.

Why we do it:

* To determine the quantities of Subaqueous excavation.

* measure areas subjected to scouring or silting in harbours or docks

* Locate rocks and other objects such as buoys lights etc to aid safe navigation

* To prepare navigation charts exhibiting the depths available for navigation

* Control floods and to plan water supply and storage from rivers

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* To develop water resources for power irrigation and recreation

Factor of Hydrographic Survey

* To measure the depth of water at various points termed as sounding.

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

* Therefore the are reduced to datum water level to correct for tidal water which undergo with help of gauge.

* The field work consist of both horizontal as well as vertical control.

* The horizontal control established by traversing or triangulation.

* For vertical control the tide gauge are kept operation continuously since the water level at that gauge must also known when sounding are recorded.

Q no 5(A)

Aerial Photogrammetry:-

Aerial Photogrammetry consist of using the Imagery gathered in the air by UAVs to create computer-generated 2D & 3D model. These model are topographical in nature, meaning they repeated the dimension & physical feature of the area of land & in stunning accuracy. These model can be rotated and zoomed.

Photogrammetry is used such as topographic mapping, architecture, engineering, manufacturing, control, police investigation & geology.

Why we do it

Photogrammetry use computer science to help people accomplish great and we are happy that so many industrial trust to keep getting the job done.

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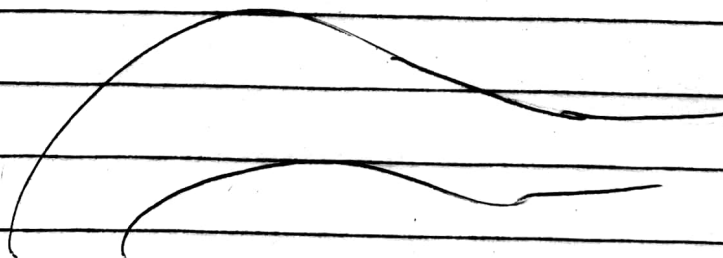
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Q no 5(B)

Procedure of Photography.

Aerial photography, technique of photographing the earth or surface or feature of its atmosphere or hydrosphere with camera mounted on aircraft, rocket or earth orbiting satellite and other spacecraft.

Aerial photography depicts an area that include several control point, the location of features which are determined by ground surveying technique. It is mainly done within the framework of space.



Q no 4(B)

Sounding:- ★ The process of determining depth below the water surface is called sounding

★ Sounding is analogous to levelling on land

★ 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 of Sounding

★ Preparation of accurate charts for navigation

★ Determination of the quantities of the material to be filled

★ Obtaining information for design of breakwaters, sea wall etc

Equipment Name:- ★ Shore signals and buoys

★ Sounding equipment

★ Angle measuring instrument

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Sec A Final term

1 ⇒ Sounding boat

2 ⇒ Sounding Pole or rod

3 ⇒ Lead line

4 ⇒ Weelcull's Sounding machine

5 ⇒ Echo Sounding machine / Fathometer