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Subject : Advance Engineering Survey

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QNO1:-

Sol:-

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

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

$$\gamma = \alpha + \beta = 90^\circ$$

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

$$KT_1 = KN = R_1 \tan\left(\frac{\alpha}{2}\right)$$

$$= 7736 \tan\left(\frac{50}{2}\right)$$

$$KT_1 = 3474.924$$

$$MN = MT_2 = R_2 \tan\left(\frac{\beta}{2}\right) = \frac{7736}{\tan(40^\circ)} \tan\left(\frac{40^\circ}{2}\right)$$

$$MT_2 = MN = 2748.703$$

$$KM = MT_2 + KT_1$$

$$KM = 6223.627$$

Find AB, by sine rule

Find  $\Delta BKM$  by sine rule

$$\frac{BK}{\sin \beta} = \frac{MK}{\sin(\alpha)}$$

$$BK = \frac{MK \sin \beta}{\sin(\alpha)}$$

$$\frac{8223.627 \sin(40)}{\sin(90)}$$

$$\frac{4000.47}{1}$$

$$BK = 4000.47$$

$$BM = \frac{MK \sin \alpha}{\sin(I)}$$

$$\frac{8223.627 \sin(50)}{\sin 90^\circ}$$

$$BM = 4767.574$$

$$T_2 = KT_1 + BK$$

$$T_2 = 3474.924 + 4000.47$$

$$= 7475.394$$

$$\begin{aligned}
 T_3 &= MT_2 + BM \\
 &= 2748.703 + 4767.574 \\
 &= 7516.277.
 \end{aligned}$$

$$L_L = \frac{\pi R_L \alpha}{180^\circ} = \frac{\pi 7552 (50)}{180^\circ}$$

$$L_S = \frac{\pi R_S \beta}{180^\circ} = \frac{\pi 7452 (40)}{180^\circ}$$

$$L_L = 6590.363 \text{ m}$$

$$L_S = 5202.477 \text{ m}$$

change of intersection point

$$7352 - 7475.394$$

$$\text{change of } T_1 = 123.394 \text{ m}$$

change of  $T_1 + L_i$

$$= 123.394 + 6590.363$$

$$= 6713.757 \text{ m}$$

change of compound curvature  
(N) plus Ls

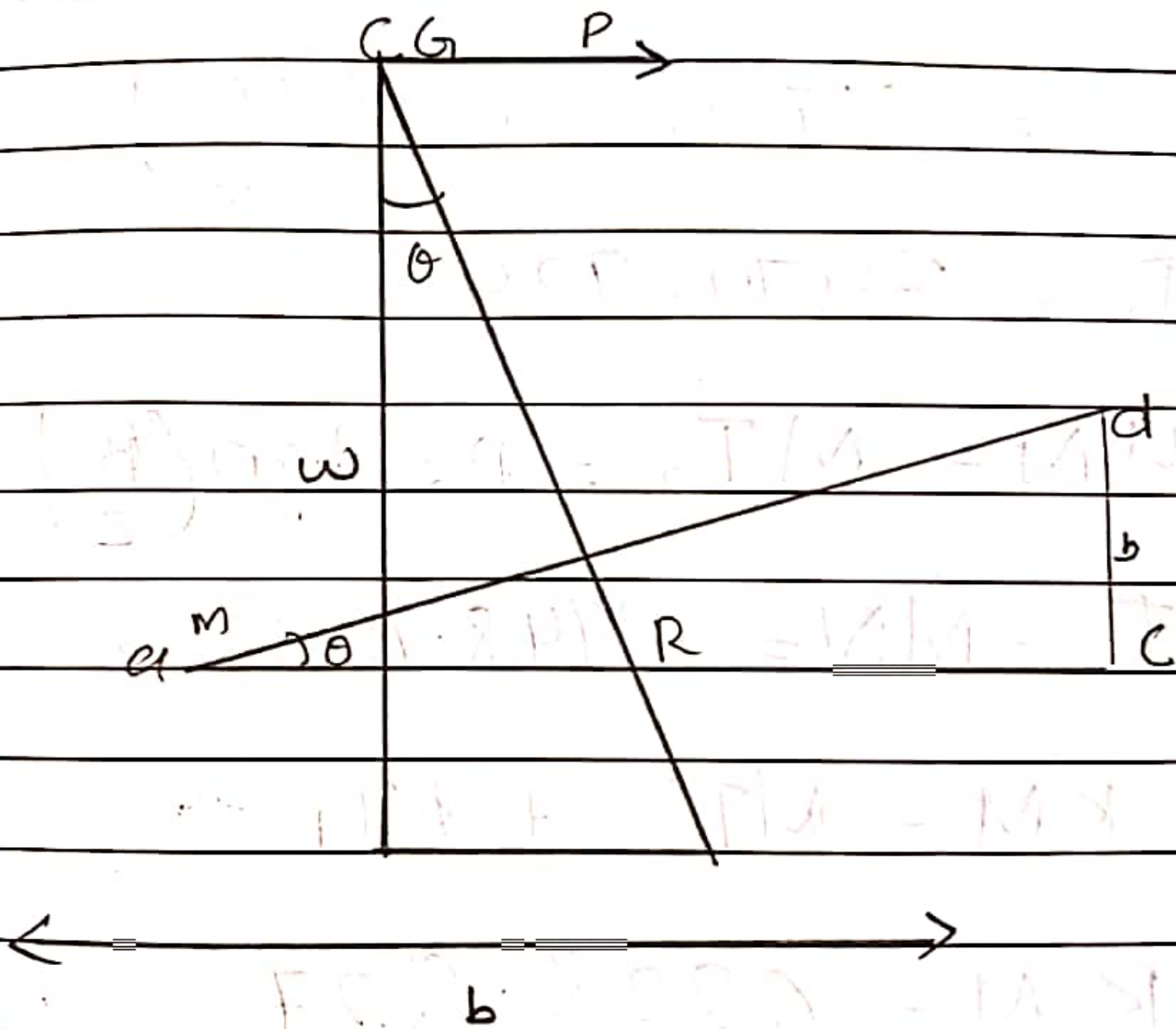
$$6466.969 + 5202.477$$

$$\text{change } T_2 = 11669.446 \text{ m.}$$

QNO (2)

## Transition Curves

- A curve of varying radius is called a transition curve. It is also called spiral curve or easement curve.
- It is used between both railway and highway between tangent and a circular curve in order to have a smooth transition from tangent to the curve and from curve to the tangent.
- It is also inserted between branches of compound curve.



Q#3

What is the difference between triangulation & trilateration? Also explain the principal of triangulation and trilateration?

### TRIANGULATION:

1. All angles are measured in triangulation.
2. Distance of baseline is measured.
3. Some check base line are also measured to control to scale error.
4. Intervisibility station is essential.
5. There are more internal check in comparison with trilateration in the same geometric figure.
6. The side length are computed on the basis of measured angle applying sine law.

### TRILATERATION:

1. All sides are measured in trilateration.
2. Azimuth of the initial line is measured.
3. Some check angle are measured to control azimuth error.
4. For small areas it is possible to measure distance without Intervisibility.



5. There are less interval checks in comparison with triangulation in the same geometric figure.

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

### Principal of triangulation:

- If all the three angles and the length of one side of a triangle are known then by trigonometry the length 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.

### Principal 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 triangle is used as triangulation system.
- All the three side of each triangle are measured in the field with the distance measuring instruments (EDMs, tape).
- Horizontal angle are not measured in the field.
- Angles in trilateration system are computed indirectly from the length of the sides of triangle by cosine formula.
- Few horizontal angle are also sometime measured to provide a check on computed angles.

## DHY Part (a)

What is Hydrographic Surveying and purpose of hydrographic Surveying?

### HYDROGRAPHIC SURVEYING:

- It is the branch of Surveying which deals with water bodies e.g. Lake, river 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 excavation.
2. Measure areas subjected to scouring or silting in harbours or docks.

2. Locate rocks and other objects such as buoys, lights etc. to aid safe navigation.
4. To prepare navigation charts exhibiting the depths available for navigation.
5. Control floods, and to plan water supply and storage from rivers.
6. To develop water resources for power, irrigation and recreation.

## Q# 4 Part (b)

What is sounding & purpose of sounding equipment? Also name

1. The process of determining depth below the water surface is called sounding.
2. Sounding is analogous to travelling on land.
- ∴ The reduce land of any point on the bottom of a water body is obtained by subtracting the sounding from the mean sea level.

### PURPOSE :

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

## Name of Equipments

1. Sounding boat.
2. Sounding pole & rod.
3. Lead line.
4. Weddells sounding machine.
5. Echo sounding machine / Fathometer.

Q5-

(A)

Aerial Photography:

Basically this can be defined as the way of taking photographs above the ground.  
Why we do it?

Aerial photography, technique of is used in category, land-use planning.

Archaeology, movie production, environmental studies, espionage, commercial advertising, conveyancing and other field.

(B) Procedure.

A photogrammetric mapping process includes obtaining aerial photography, completing ground control network, constructing map from photos, checking the compiled map data for compliance with project specification. The ground control point to be measured by photogrammetry should be signalized before the flight.