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I.D = 16757

SUB = Advance Survey.

Semester = 4th

1

Q1(a) = Two tangents meet at a chainage of 16757 ft ....?

ANSWER :-

Tangents meet at chainage = 16757ft

Deflection angle = 14° 13′ 23″

Degree of Curve = 6°.

SOLUTION :-

Degree of curve taken 6°

$D = 6°$

$R = 5729.58/D$

$= \frac{5729.58}{6°}$

$= 1145.91ft$

TANGET Length $= BT_1 = BT_2 =$

$$R \tan \theta/2.$$

$$BT_1 = BT_2 = 1145.91 \times \tan\left(\frac{14^\circ 13' 23''}{2}\right)$$

$$BT_1 = BT_2 = 142.96 \text{ ft}.$$

LENGTH of Curve :-

$$L = \frac{\pi R \theta}{180}$$

$$= \frac{3.14 \times 1145.91 \times 14^\circ 13' 23''}{180^\circ}$$

$$L = 284.45 \text{ ft}$$

Chainage of intersection point = 16757

minus tangent length = -142.96 ft

Chainage of T_1 = 16614.04 ft.

plus $L = 284.45 ft$.

Chainage $T_2 = 17041.45 ft$.

Length of chord = l =

$= 2R \sin \theta/2$.

$= 2 \times 1145.91 \times \sin\left(\frac{14^\circ 13' 23''}{2}\right)$

$= 283.72 ft$.

Mid ordinate :-

$R(1 - \cos \theta/2)$.

$1145.91 (1 - \cos(\frac{14^\circ 13' 23''}{2})$

$= 8.81 ft$.

External Distance :-

$$R(\sec(\theta/2)-1)$$

$$= 1145.91\left(\sec\left(\frac{14^\circ 13' 23''}{2}\right)-1\right)$$

$$= 8.88 ft.$$

Q1(b). Find the area from the data obtained from chain .....?

offset No:-	offset	SIMPson Multiplier	Product.
1	16.757	1	16.757
2	19.757	4	79.028.
3	20.757	2	41.514.
4	14.7547	4	59.028.
5	12.757	2	25.514.
6	13.757	1	13.757.

$\Sigma = 235.598$

Area $= (h_r h)$.

$\Delta\eta = 6^\circ 55$

$= b/3 \times 235.598$

$= \frac{30}{3} \times 235.598$

$\boxed{\text{Total area} = 2355.98\ m^2}$

Q 3) Two tangets AB and BC ...?

GIVEN DATA:-

$\angle AKM = 130°$

$\angle KMC = 140°$.

1st arc radiu $\Rightarrow (16757 - 300) = 16457m$

2nd arc radius $\Rightarrow (16757 - 200) = 16557m$.

Chainage of intersection $\Rightarrow$

$(16757 - 400)$

$= 16357\ m$

REQUIRED:-

Tangets points = ?

Compound Curvature = ?

Solution:-

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

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

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

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

$KT_1 = KN = R_1 \tan(\alpha/2)$

putting

$= 16457 \tan\left(\frac{50^\circ}{2}\right)$

$KT_1 = 7674.024m$

Now $\Rightarrow$

$MN = MT_2 = R_s \tan(\beta/2)$

$= 16557 \times \tan\left(\frac{40}{2}\right)$

$$\boxed{MT_2 = 6026.25\,m}$$

$$KM = MT_2 + KT_1$$

$$= 7674.024 + 6026.25$$

$$\boxed{KM = 13700.274}$$

Now finding,

$$\frac{BK}{MK\sin\beta} = \frac{1}{\sin I}$$

$$BK = \frac{MK\sin\beta}{\sin I} \Rightarrow \frac{13700.27 \times \sin 40^\circ}{\sin 90^\circ}$$

$$\boxed{= 8806.36}$$

$$BM = \frac{MK\sin\alpha}{\sin I} = \frac{13700.27 \times \sin 50^\circ}{\sin 90^\circ}$$

$$\boxed{= 10495.01}$$

$T_L = KT_1 + BK = 7674.02 + 8806.36$

$= \boxed{16480.38\ m}$

$T_S = MT_2 + BM = 6026.25 + 10495.01$

$= \boxed{16521.26\ m}$

$L_L \Rightarrow \frac{\pi R_s \beta^{\alpha}}{180} = \frac{3.14 \times 16457 \times 50^\circ}{180^\circ}$

$\boxed{= 14354.16\ m}$

$L_S = \frac{\pi R_s \beta}{180} = \frac{3.14 \times 16557 \times 40^\circ}{180^\circ}$

$= \boxed{11553.10\ m}$

Chainage of intersection point

$\boxed{= 16357\ m}$

Chainage of intersection point

$-T_L = -16480.38m$.

$\boxed{\text{Chainge of } T_1 = -123.38}$.

$+L = 14354.16m$

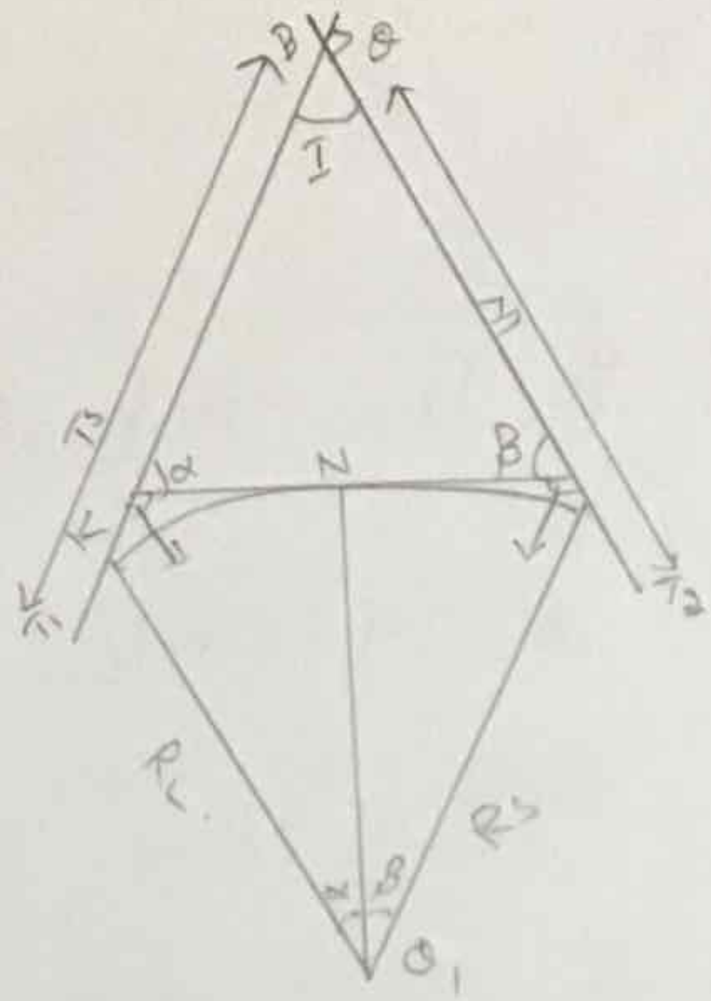
$= 14230.78m$.

Chainage of Compound Curvature =>

plus (Ls) $= 11553.10m$.

$\boxed{\text{Chainage of } T_2 = 25783.88m}$

Diagram



Question No = 2.

A circular curve ....?

GIVEN DATA:-

Circular radius =

16757 - 16473

= 284 m.

Deflection angles = 20° 40′

point of intersection

16757 - 14210

= 2547.

Inveral = 20m.

Solution:-

$R = 284 \times 2 = 568m$.

$BT_1 \Rightarrow BT_2 \Rightarrow R\tan\theta/2$

putting values

$BT_1 \Rightarrow BT_2 \Rightarrow 568\tan\frac{20°40'}{2}$

$= 103.56m$.

Now finding Length of Curve $\Rightarrow$

As we know that

$$L = \frac{\pi R\theta}{180°}$$

$$= \frac{\pi \times 568 \times 20°40'}{180°}$$

$= 204.87m$.

Chainage of point of intersection

$= 2547m$.

Subtract Tangent = -103.56m

Chainage of T_1 = 2443.44m

Adding L = +204.87m.

Chainage of T_2 = 2648.31m

Length of 1st chord = C_1

= 2460 − 2443.44

= 16.56m.

$C_2 = C_3 = C_4 = C_5 = C_6 = C_7 = C_8 = C_9 = C_{10}$

C_{11} = 2648.40 − 2630

= 18.40m

By deflection method

$$\delta_1 = \frac{1718.9 \times C_1}{60R} \text{ (degree)}$$

$$\delta_1 = \frac{1718.9 \times 16.56}{60(568m)}$$

$$\boxed{\delta_1 = 0^\circ 50' 6.86''}$$

$$\delta_2 = \frac{1718.9 \times 20}{60(568m)}$$

$$\boxed{\delta_2 = 1^\circ 0' 31.48''}$$

$$\delta_2 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6 = \delta_7 = \delta_8 = \delta_9 = \delta_{10}$$

$$\boxed{\delta_{11} = 0^\circ 55' 40.96''}$$

Total deflection angle for the chord is;.

$\Delta_1 = \delta_1 = 0^\circ 50' 6.86''$

$\Delta_2 = \delta_1 + \delta_2 = 0^\circ 50' 6.86'' + 1^\circ 0' 31.48''$

$\Delta_3 = \delta_2 + \delta_3 = 2^\circ 51' 9.82''$

$\Delta_4 = 3^\circ 51' 41.3''$

$\Delta_5 = 4^\circ 52' 12.78''$

$\Delta_6 = 5^\circ 52' 44.26''$

$\Delta_7 = 6^\circ 53' 47.22''$

$\Delta 8 = 7^\circ 53' 47.22''$

$\Delta 9 = 8^\circ 54' 18.7''$

$\Delta 10 = 9^\circ 54' 50.81''$

$\Delta 11 = 10^\circ 50' 31.54''$

Check $\frac{\theta}{2} = \frac{20^\circ 40'}{2}$

$\boxed{= 10^\circ 20'}$.