Q1) A)

Two Tangents meet at a chainage of (1+0) ft with the deflection Angle of 14° 13' 23". Degree of Curve is 5°.

Calculate.

1) Chainage at the begining And end of the Curve.

2) length of long chord.

3) Mid ordinate And External Distance.

Solve Given Data :-

⇒ Two tangents meet at a chainage of 7892 ft.

⇒ Deflection Angle 14° 13' 23"

⇒ Degree of Curve is 5°.

(A)

$D = 5°$

$R = 5729.58/D = 1145.9171$

Tangent length = $BT_1 = BT_2$

$\Rightarrow R \tan \frac{\Delta}{2}$

$\Rightarrow 1145.9171 \times \tan\frac{(14^\circ 13' 23'')}{2}$

$\Rightarrow BT_1 = BT_2 = 142.96 ft$

Length of Curve

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

$\Rightarrow \frac{3.14 \times 1145.9171 \times (14^\circ 13' 23'')}{180}$

$\Rightarrow L = 284.45 ft$

$\Rightarrow$ Chainage of Intersection Point = 7892 ft

$\Rightarrow$ Minus tangent length = -142.96 ft.

Plus length of curve = 284.45 ft.

Chainage of T_2 = 8033.49 ft

Length of Chord = l =

$2R \sin(\Phi/2)$

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

= 283.72 ft

⇒ Mid Co-ordmate.

$R(1 - \cos(\Phi/2))$

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

= 8.81 ft

⇒ External Distance.

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

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

= 8.88 ft

NO1) (B)

Offset No	offset	Simpson Multiplier	Produc
1	7.892	1	7.892.
2	10.426	4	41.704
3	11.426	2	22.852
4	5.426	4	21.704
5	3.426	2	6.852
6	4.426.	1	4.426.

$\Sigma = 105.43.$

Area $(h_1 - h_6)$

$= \frac{b}{3} \times 105.43.$

$= \frac{30}{3} \times 105.43.$

$= 1054.3\ m^2.$

(Q NO2)

Given Data :-

Circular Radius = 7892 - 200

7692 m.

Deflection Angle = 20° 40'

Point of Intersection = 7892 - 400

= 7492 m.

Interval = 20m.

Sol:-

$$R = 7692 \times 2 = 15384 m$$

$$BT_1 = BT_2 = R \tan \frac{\phi}{2}$$

$$BT_1 = BT_2 = 15384 \tan \frac{20° 40'}{2}$$

$$= 2805.012 m.$$

$$\Rightarrow \text{Length of Curve} = L = \frac{\pi R \phi}{180°}$$

$$L = \frac{3.14 \times 15384 \times 20° 40'}{180}$$

$l = 5546.21m$

Chainage of point of Intersection

7492m.

minus Tangent = $-2805.12m$

Chainage of T_1 = 4686.88m

Plus $L = 5546.21m$

Chainage of T_2 = 13038.88m

Length of first chord = C_1

(Assume) 4700.00 − 4686.88

$C_1 = 14.12m$.

$C_2 = C_3 = C_4 = C_5 = C_6 = C_7 = C_8 = C_9 = C_{10} = 20m.$

$C_{11} = 13038.88 - 13024.$

$C_{11} = 14.12m$

By deflection Method

$$\delta_1 = 1718.9 \times C_1 / 60R \quad \text{(Degree)}.$$

$$\delta_1 = 17.18.9 \times 14.12 / 60 \times 15384$$

$$\delta_1 = 0^\circ\ 1'\ 33.6''$$

$$\delta_2 = 1718.9 \times 20 / 60 \times 15384.$$

$$\delta_2 = 0^\circ\ 2'\ 14.0796''$$

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

$$\delta_{11} = 1718.9 \times 14.22 / 60 \times 15384$$

$$\delta_{11} = 0^\circ\ 1'\ 35.3306''.$$

Total Deflection Angle for the Chord is.

$$\Delta_1 = \delta_1 = 0^\circ\ 1'\ 33.6''$$

$$\Delta_2 = \delta_1 + \delta_2 = 0^\circ\ 3'\ 47.6976''$$

$\Delta_3 = 0^\circ 5' 21.2976''$

$\Delta_4 = 0^\circ 9' 8.99436''$

$\Delta_5 = 0^\circ 14' 30.292''$

$\Delta_6 = 0^\circ 23' 39.2866''$

$\Delta_7 = 0^\circ 38' 9.5786''$

$\Delta_8 = 1^\circ 1' 48.8652''$

$\Delta_9 = 1^\circ 39' 58.4438''$

$\Delta_{10} = \Delta_9 + S_{10} = 1^\circ 39' 58.4438'' + 0^\circ 1' 35.3306''$

$\Delta_{10} = 1^\circ 41' 33.774''$

$\Delta_{11} = \Delta_{10} + S_{11} = 1^\circ 41' 33.774'' +$

$0^\circ 1' 35.3306''$

$\Delta_{11} = 1^\circ 43' 9.1046''$

(9)

Q.No3) Given Data :-

$\Delta AKM = 130^\circ$

$\Delta KMC = 140^\circ$

1st arc radius = (7892 - 300) = 7592 m

2nd arc radius = (7892 - 200) = 7692 m

Chainage of Intersection = (7892 - 400)
= 7492 m.

Solution :-

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

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

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

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

$KT_1 = KN = R_1 \tan(\alpha/2) = 7592 \tan 50/2.$

$= 3540 m$

$KT_2 = MT_2 = R_2 \tan \beta/2 = 7692 \tan 40/2.$

$= 2799.659 m$

$KM = MT_2 + KT_1 = 2799 + 3540 = 6339m$

Now

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

$$BK = MK \sin\beta / \sin I$$

$$BK = 6339 \times \sin 40° / \sin 90° = 4047.6m$$

$$BM = MK \sin\alpha / \sin I$$

$$BM = 6339 \times \sin(50) / \sin 90° = 4855.9m$$

$T_L = KT_1 + BK = 3540 + 4047 = 7587m.$

$T_S = MT_2 + BM = 2799 + 4855.9 = 7654.9m$

$$L_L = \frac{\pi R_L \alpha}{180} = \frac{3.14 \times 7592 \times 50}{180} = 6621.91m$$

$$L_S = \frac{\pi R_S \beta}{180} = \frac{3.14 \times 7692 \times 40}{180} = 5367.306m$$

Chainage of Intersection Point.
= 7492

$-T_L$ = - 7587

Chainage of T_1 = - 95m

Plus L_L = 6526.91m.

Chainage of Compound Curvature.

Plus L_S = 6621.91.

Chainage of T_2 = 13148.82m