Name :- Zohaib khan

ID # 7909

Section :- "A"

Paper :- Survey II

Dept : Civil Engineering

Q#1:- (A) Part

Given:-

Tangent Meet at Chainage = 79097t

Deflection Angle = $14^\circ 13' 23''$

Degree of Curve = 5°

Sol:-

$D = 5^\circ$

$R = 5729.58/D$

$= 5729.58/5^\circ$

$= \boxed{1145.917t}$

Tangent length $= BT_1 = BT_2 = R \tan(\Phi/2)$

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

$BT_1 = BT_2 = \boxed{142.967t}$

Length of Curve $L = \frac{\pi R \Phi}{180}$

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

$\boxed{L = 284.457t}$

Chainage of Intersection Point = 7909

Chainage of T_1 = ID − tangent length

= 7909 − 142.96

$T_1 = 7766.047t$

Chainge of $T_2 = T_1 + L$

= 7766.04 + 284.45

$T_2 = 8050.497t$

Length of Chord = $2R\sin(\Phi/2)$

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

$= 283.727t$

Mid ordinate = $R(1-\cos(\Phi/2))$

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

$= 8.817t$

External Distance = $R(\sec(\Phi/2)-1)$

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

$= 8.887t$

Q#1:- (B) Part:-

Chainage (m)	Offset	Simpsom Multiplier	Product
0	7.909	1	7.909
30	7.909+3 = 10.909	4	43.636
60	7.909+4 = 11.909	2	23.818
90	7.909-2 = 5.909	4	23.636
120	7.909-4 = 3.909	2	7.818
150	7.909-3 = 4.909	1	4.909

$\Sigma = 111.726$

$$\text{Area} = \frac{b}{3} \times \Sigma \text{ Product}$$

$$= \frac{30}{3} \times (111.726)$$

$\because b = 30$

$$\text{Area} = 1117.26 \text{ m}^2$$

Q# 2:-

Given data:-

First Assume a value = 7000

Circular Radius = 7909 - 7000

$$R = 909\,m$$

Now

Deflection Angle = $20^\circ 40' 0''$

Peg Interval also given which is = 20 m

Chainage at Point of Intersection which we also assume a value

= I.D - Assumed value

= 7909 - 4000

= 3909 m

Now, we can find tangent length

$$BT_1 = BT_2 = 909 \tan\left(\frac{20^\circ 40'}{2}\right)$$

$$= 165.739\,m$$

Now find length of Curve

$$L = \frac{\pi R \phi}{180^\circ}$$

$$= \frac{(3.14)(909)(20^\circ 40')}{180^\circ}$$

$$\boxed{L = 327.711 \text{ m}}$$

$$T_1 = 3909 - 165.739$$

$$\boxed{T_1 = 3743.261}$$

Chainage at $T_2 = 3743.261 + 327.711$ ($T_1 + L$)

$$\boxed{T_2 = 4{,}070.972 \text{ m}}$$

Now again Assume a value 3770

Length of 1st Sub chord = 3770 − 3743.261 (Assume − T_1)

$$\boxed{C_1 = 26.739}$$

Again we can Assumed a value which is 4040

Length of Last Sub chord = 4070.972 - 4040

$$C_{last} = 30.972\ m$$

We also know that

$$C_2 = C_3 = C_4 = \dots C_{14} = 20m$$

Now we can find No. of Chords

$$\text{No. of chords} = \frac{\text{Length of Curve} - C_1}{\text{Interval}}$$

$$= \frac{327.711 - 26.739}{20}$$

$$= 15 \text{ chords}$$

Now we can find deflection Angles:-

$$\delta_1 = \frac{1718.9 \times C_1}{60\ R}$$

Putting values

$$\delta_1 = \frac{1718.9 \times 26.739}{60 \times 909} = 0^\circ 50' 33.77''$$

$$\delta_2 = \frac{1718.9 \times 20}{60 \times 909}$$

$$\boxed{\delta_2 = 0^\circ 37' 49.17''}$$

We also know that

$$\delta_2 = \delta_3 = \delta_4 = \dots \delta_{14} = 0^\circ 37' 49.17''$$

$$\delta_{15} = \frac{1718.9 \times C_{15}}{60 \times 909}$$

$$= \frac{1718.9 \times 30.972}{60 \times 909}$$

$$\boxed{\delta_{15} = 0^\circ 58' 34.04''}$$

Now total deflection (tangential) angle for the chords are

$$D_1 = \delta_1 = 0^\circ 50' 33.77''$$

$$D_2 = D_1 + \delta_2 = 1^\circ 28' 22.94''$$

$$D_3 = D_2 + \delta_3 = 2^\circ 6' 12.11''$$

$$D_4 = D_3 + \delta_4 = 3^\circ 21' 50.45''$$

$D_5 = D_4 + \delta_5 = 3^\circ\ 59'\ 39.62''$

$D_6 = D_5 + \delta_6 = 4^\circ\ 37'\ 28.79''$

$D_7 = D_6 + \delta_7 = 5^\circ\ 15'\ 17.96''$

$D_8 = D_7 + \delta_8 = 5^\circ\ 53'\ 7.13''$

$D_9 = D_8 + \delta_9 = 6^\circ\ 30'\ 56.3''$

$D_{10} = D_9 + \delta_{10} = 7^\circ\ 8'\ 45.47''$

$D_{11} = D_{10} + \delta_{11} = 7^\circ\ 46'\ 34.64''$

$D_{12} = D_{11} + \delta_{12} = 8^\circ\ 24'\ 23.81''$

$D_{13} = D_{12} + \delta_{13} = 9^\circ\ 2'\ 12.98''$

$D_{14} = D_{13} + \delta_{14} = 9^\circ\ 40'\ 2.15''$

$D_{15} = D_{14} + \delta_{15} = 10^\circ\ 38'\ 36.19''$

Q#3:-

Given data:-

$\Delta AKM = 130°$

$\Delta KMC = 140°$

1st arc Radius = (7909-300) = 7609m

2nd arc Radius = (7909-200) = 7709m

Chainage of Intersection Point

(7909-400) = **7509**

Required:-

Tangent Points = ?

Compound Curvature = ?

Sol:-

$\alpha = 180° - 130° = 50°$

$\beta = 180° - 140° = 40°$

$\phi = \alpha + \beta = 90°$

$I = 180° - \phi = 180° - 90° = 90°$

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

$= (7609) \tan(\frac{50°}{2})$

$$KT_1 = 3548.134\ m$$

Again

$$MN = MT_2 = R_2 \tan(\beta/2)$$

$$= (7709)\tan(4°/2)$$

$$MN = 2805.846$$

Now

$$\frac{Bk}{Mk \sin\beta} = \frac{1}{\sin I}$$

$$Bk = \frac{Mk \sin\beta}{\sin I}$$

$$= \frac{6353.98 \times \sin(40°)}{\sin 90°} \quad \because I = 90°$$

$$Bk = 4084.259$$

Now

$$BM = \frac{Mk \sin\alpha}{\sin I} = \frac{6353.98 \times \sin(50°)}{\sin 90°}$$

$$BM = 4867.431$$

$$T_L = KT_1 + BK = 3548.134 + 4084.259$$

$$\boxed{T_L = 7632.393}$$

$$T_S = MT_2 + BM = 2805.846 + 4867.431$$

$$\boxed{T_S = 7673.277}$$

$$L_L = \frac{\pi R L \alpha}{180} = \frac{(3.14)(7609)(50^\circ)}{180^\circ}$$

$$\boxed{L_L = 6636.738}$$

Now

$$L_S = \frac{\pi R_S B}{180} = \frac{(3.14)(7709)(40^\circ)}{180^\circ}$$

$$\boxed{L_S = 5379.168}$$

Chainage of Intersection Point = 7509

Chainage of Intersection Point $- T_2 = -123.393$

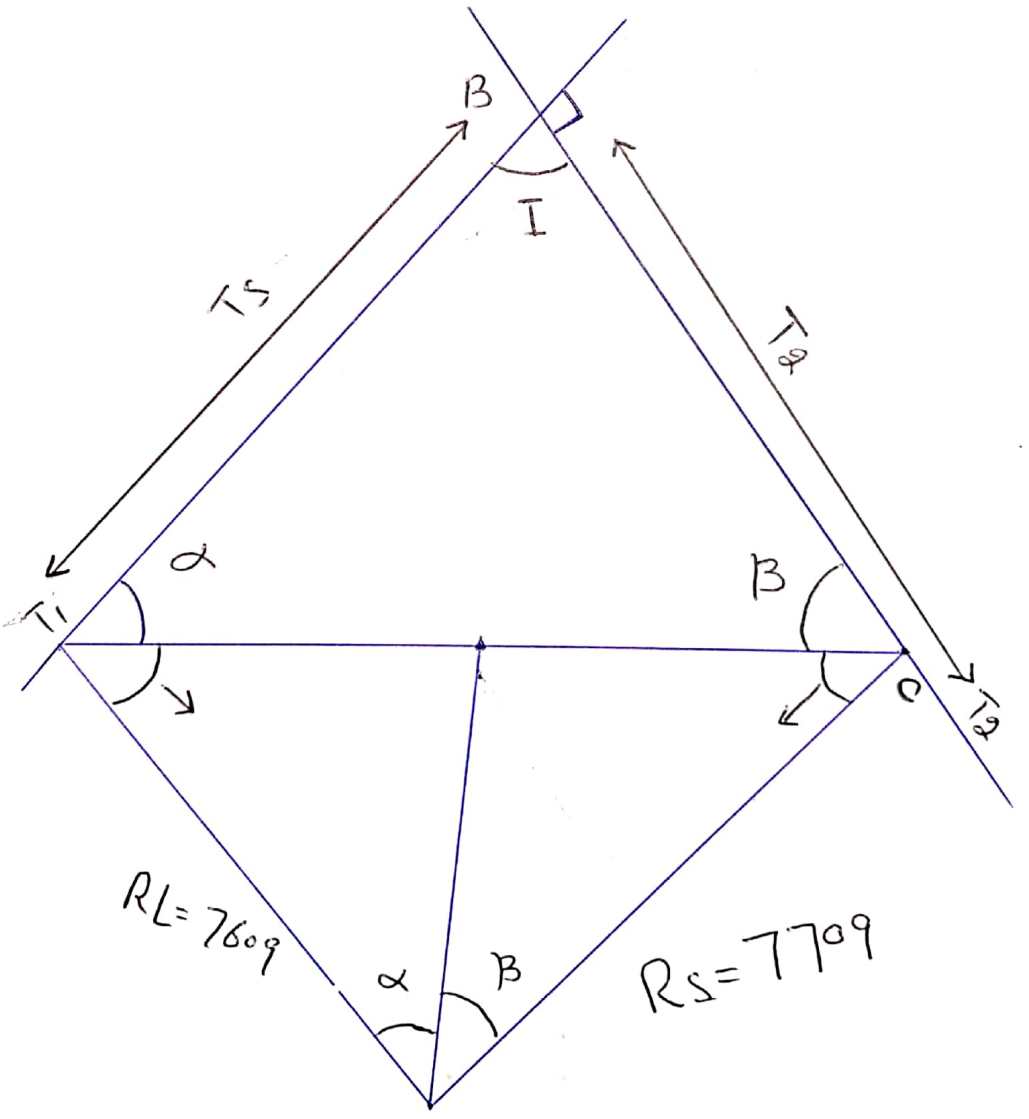
Now add $L_L = -123.393 + 6636.738$

$$= \boxed{6513.345}$$

Chainage Compound Curvature (N)

Add Ls = 6513.345 + 5379.168

Chainage of T_2 = 11892.513



THE END