Q # A Part

Given

Tangent Meet at chainage = 7890 ft

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

Degree of Curve = 5°

Solu:

$D = 5^\circ$

$R = 5729.58 / D = 5729.58 / 5$

$\boxed{R = 1145.91 ft}$

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

$= 1145.91 (\tan(14^\circ 13' 23'' / 2))$

$BT_1 = BT_2 = \boxed{142.96 ft}$

Length of Curve $= \dfrac{\pi R \Phi}{180} = \dfrac{(3.14)(1145.91)(14^\circ 13' 23'')}{180^\circ}$

$\boxed{L = 284.45 ft}$

Chainage of intersection point = 7890

Chainage of T_1 = ID − Tangent length
$= 7890 - 142.96 = 7747.04$

$\boxed{T_1 = 7747.04 ft}$

Chainage of $T_2 = T_1 + L$

$T_2 = 7747.04 + 284.45$
$\boxed{T_2 = 8031.49}$

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

$= 2(1145.91) \sin\left(\frac{14°13'23''}{2}\right)$
$= \boxed{283.72 ft}$

Mid ordinate $= R\left(1 - \cos\left(\frac{\phi}{2}\right)\right)$
$= (1145.91)\left(1 - \cos\left(\frac{14°13'23''}{2}\right)\right)$
$= \boxed{8.81 ft}$

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External distance = $R\left(\sec\left(\frac{\phi}{2}\right)-1\right)$

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

$= \boxed{8.887t}$

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Q # B part

Chainag (m)	offset	simpson Multiplier	Product
0	7.890	1	7.890
30	7.890+3= 10.890	~~10~~ 4	43.56
60	7.890+4= 11.890	2	23.78
90	7.890-2= 5.890	4	23.56
120	7.890-4= 3.890	2	7.78
150	7.890-3= 4.890	1	4.890

$$\boxed{\Sigma = 111.46}$$

$$\text{Area} = \frac{b}{3} \times \Sigma \text{ of Product} \qquad \because b = 30$$

$$= \frac{30}{3} \times (111.46)$$

$$\boxed{\text{Area} = 1114.6\,m^2}$$

Q# 2:

Given data

first Assume value = 7000

Circular radius = 7890 - 7000

$\boxed{R = 890\ m}$

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

peg interval also given which is = 20m

Chainage at point of intersection which we also assume a value

= ID — Assume value

= 7890 - 5000 = $\boxed{2890m}$

Now we can find tangent length

$BT_1 = BT_2 = 890 \tan\left(\frac{20^\circ 40'}{2}\right)$

$\boxed{BT_1 = 162.27m}$

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Now find length of curve.

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

$$= \frac{(3.14)(890)(20^\circ 40')}{180^\circ}$$

$$\boxed{L = 320.86\ m}$$

$T_1 = 3890 - 162.27 = 3727.73$

$$\boxed{T_1 = 3727.73}$$

Chainage at $T_2 = 3727.73 + 320.86$

$$\boxed{T_2 = 4{,}048.59}$$

Assum value 3770

Now length of 1st Sub-chor

$= 3770 - 3727.73 = 42.27$

$$\boxed{C_1 = 42.27}$$

Again length of last Sub-chord

Assumed value ~~4~~52 40?

$\Rightarrow$ ~~4048.59 - 4065 =~~

$\Rightarrow 4048.59 - 4026$

$$\boxed{C_{14} = 22.59}$$

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

Now we can find No of chord

$$\text{No of chord} = \frac{\text{length of curve} - C_1}{\text{Interval}}$$

$$= \frac{325.127 - 42.27}{20}$$

$= 14.14$ chords

$= 14$ chords

Now find deflection Angle.

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

$$\delta_1 = \frac{1718.9 \times 42.27}{60 \times 890}$$

$$= \frac{72657.903}{53,400}$$

$\delta_1 = 1.36063$

$\delta_1 = ~~1^\circ 36' 63''~~ = 1^\circ 21' 38.27''$

$$\delta_2 = \frac{1718.9 \times 20}{60 \times 890} \Rightarrow \delta_2 = \frac{34378}{53,400}$$

$\delta_2 = 0.64378 = 0^\circ 38' 37.61$

As we know that $\delta_2 = \delta_3 = \delta_4 = \cdots \delta_{13}$

$$\delta_{14} = \frac{1718.9 \times 22.59}{60 \times 890}$$

$$= 0^\circ 43' 37.75''$$

Now we can find total deflection -

$D_1 = \delta_1 = 1^\circ 21' 38.27''$

$D_2 = D_1 + \delta_2 = 2^\circ 0' 15.88''$

$D_3 = D_2 + \delta_3 = 2^\circ 38' 53.49''$

$D_4 = D_3 + \delta_4 = 3^\circ 17' 31.1''$

$D_5 = D_4 + \delta_5 = 3^\circ 56' 8.71''$

$D_6 = D_5 + \delta_6 = 4^\circ 34' 46.32''$

$D_7 = D_6 + \delta_7 = 5^\circ 13' 23.93''$

$D_8 = D_7 + \delta_8 = 5^\circ 52' 1.54''$

$D_9 = D_8 + \delta_9 = 6^\circ 30' 39.15''$

$D_{10} = D_9 + \delta_{10} = 7^\circ 9' 16.76''$

$D_{11} = D_{10} + \delta_{11} = 7^\circ 47' 54.37''$

$D_{12} = D_{11} + \delta_{12} = 8^\circ 26' 31.98''$

$D_{13} = D_{12} + \delta_{13} = 9^\circ 5' 9.59''$

$D_{14} = D_{13} + \delta_{14} = 9^\circ 48^\circ 47.34''$ Ans

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Q.No3: Given Data:

$\Delta AKM = 130^\circ$

$\Delta KMC = 140^\circ$

1st arc radius = $(7547 - 300) = 7247m$

2nd arc radius = $(7547 - 200) = 7347m$

chainage of intersection point = $7547 - 400 = 7147m$

Required.

Tangent points = ?

Compound Curvature = ?

Solu:-

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

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

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

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

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

$= 7247 \tan(50^\circ/2)$

$KT_1 = KN = 3379.33m$

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

$= 7347 \tan(\frac{40^\circ}{2})$

P.T.O

$MN = MT_2 = 2674.08\ m$

$KM = MT_2 + KT_1 = 3379.33 + 2674.08$

$KM = 6053.41\ m$

Now,

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

$$BK = \frac{MK \sin\beta}{\sin I} = \frac{6053.41 \times \sin 40^\circ}{\sin 90} = 3891.05$$

$$BM = \frac{MK \sin\alpha}{\sin I} = \frac{6053.41 \times \sin 50^\circ}{\sin 90} = 4637.18\ m$$

$$T_L = KT_1 + BK = 3379.33 + 3891.05 = 7270.38\ m$$

$$T_s = \frac{\pi R_L \alpha}{180} = \frac{\pi \times 7247 \times 50}{180} = 6324.20\ m$$

$$L_s = \frac{\pi R_s \beta}{180} = \frac{\pi \times 7347 \times 40}{180} = 5129.17\ m$$

Chainage of intersection point

$= 7147\ m$

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Chainage of Intersection point

$- T_L = -7270.38m$

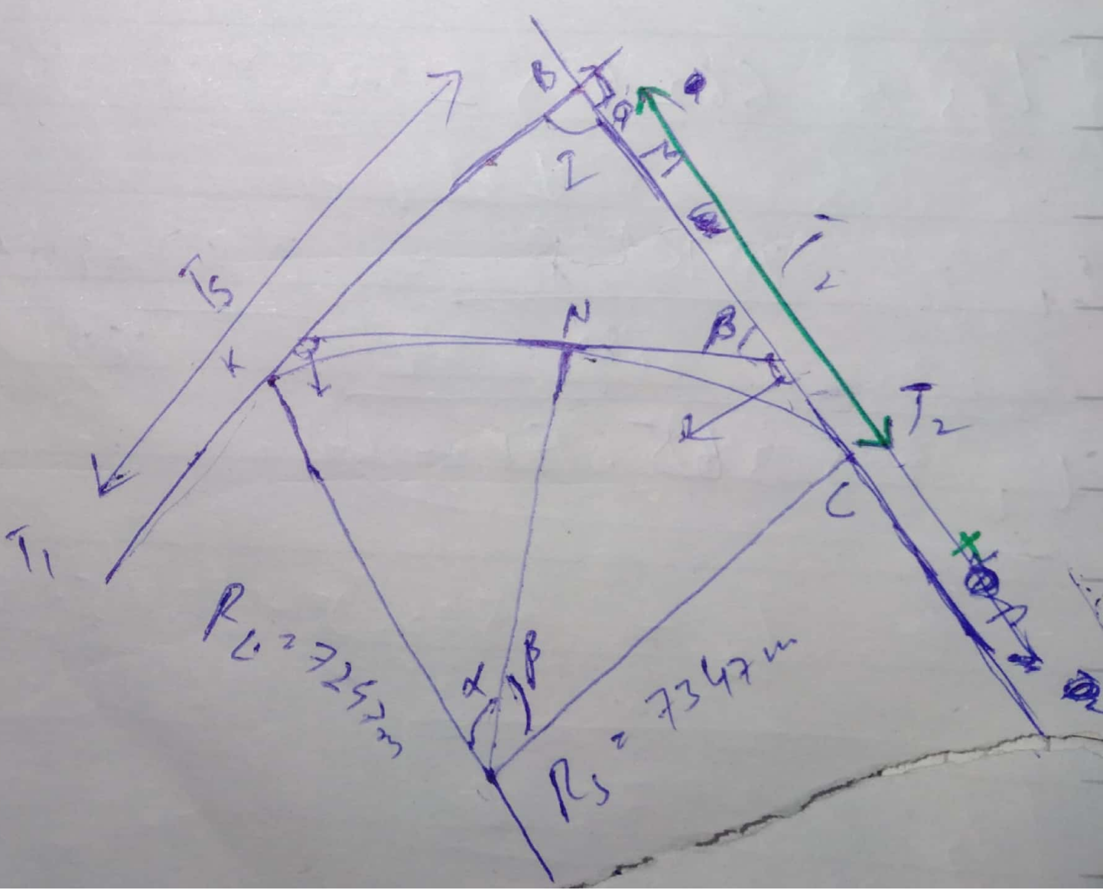
Chainage of $T_1 = -123.38m$

plus $L = +6324.26m = 6200.88m$

Chainage of Compound Curvature

(bt) plus $L_s = 5129.17m$

Chainage of $T_2 = 11330.05m$



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