Name Attaullah khan

ID 7933

Section B

Subject Adv Eng Survieng

Department CIVIL

Exam Mid term

1)

Question No = 1 Part (a)

Tangent meet at chainage = 7933 ft

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

Degree of curve = 5°

Sol:

$$D = 5^\circ$$

$$R = \frac{5729.58}{D} \Rightarrow \frac{5729.58}{5^\circ} = 1145.91$$

Tangent length $= BT_1 = BT_2 =$

$$\Rightarrow R \tan\left(\frac{\phi}{2}\right)$$

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

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

2)

Lenth of curve:-

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

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

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

chainage of intersection point = 7933 ft

minus tangent lenth = -142.96

chainage of T_1 = 7790.04 ft

Plus L = 284.45 ft

Chain of T_2 = 8074.49 ft

(3)

Length of chord = I =

$$\Rightarrow 2R\sin\left(\frac{\phi}{2}\right)$$

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

$$\Rightarrow 283.72 \text{ ft}$$

Mid ordinate:

$$R\left(1-\cos\left(\frac{\phi}{2}\right)\right)$$

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

$$= 8.81 \text{ ft}$$

External distance:

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

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

$$\boxed{= 8.88 \text{ ft}}$$

(4)

Q = 1

Question No # Part (b)

ID => 7933

offset No	offset	Simpson multiplier	Product
0	7.933	1	7.933
30	10.933	4	43.732
60	11.933	2	23.866
90	5.933	4	23.732
120	3.933	2	7.866
150	4.933	1	4.933

$\Sigma = 112.062$

Area $(h_1 - h_6)$

$\Rightarrow \frac{b}{3} \times 112.062$

$\Rightarrow \frac{30}{3} \times 112.062$

$\Rightarrow 1120.62\ m^2$

(1) Question No# 2

Given data :-

Circular radius = 7933 - 7653

I Assume value = 7653

=> 280m

Deflection angle = 20° 40'

Point of intersection = 7933 - 5500

I assume value = 5500 m

=> 2433 m

interval = 20m

(2)

Sol:

$$R = 280 \times 2 = 560\ m$$

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

$$BT_1 = BT_2 = 560 \tan \frac{20°40'}{2}$$

$$\Rightarrow 102.10\ m$$

Length of curve:

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

$$L = \frac{\pi\ 560\ 20°40'}{180}$$

$$L = 201.70\ m$$

(3)

Chainage of Point of intersection =

2433 m

minus tanget = -102.10

Chainge of T_1 = 2330.9 m

Plus L = 201.70

Chainage of T_2 = 2532.6 m

Lenth of ist chord = C_1

Assume value = 2345

$\Rightarrow$ 2345 - 2330.9

$\Rightarrow$ [redacted]

$C_1 \Rightarrow$ 14.1 m

(4)

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

$C_{11} = 2532.6 - 2515$

$C_{11} = 17.6\,m$

By deflection method

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

$$\Rightarrow \frac{1718.9 \times 14.1}{60 \times 560}$$

$$\boxed{\delta_1 = 0°43'16.77''}$$

$$\delta_2 = \frac{1718.9 \times 20}{60 \times 560}$$

$$\boxed{\delta_2 = 1°1'23.36''}$$

5)

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

$$\delta_{11} = \frac{1718.9 \times 17.6}{60 \times 560} \Rightarrow 0°54'1.35''$$

Total deflection (tangential) angle for the chord is,

$\Delta_1 = \delta_1 = 0°43'16.77''$

$\Delta_2 = \delta_1 + \delta_2 = 0°43'16.77'' + 1°1'23.36''$

$\Rightarrow$ **1°44'40.13''**

$\Delta_3 = 2°46'3.49''$

$\Delta_4 = 3°47'26.85''$

$\Delta_5 = 4°48'50.21''$

$\Delta_6 = 5°50'13.57''$

6)

$\Delta_7 = 6^\circ 51' 38.93''$

$\Delta_8 = 7^\circ 53' 0.29''$

$\Delta_9 = 8^\circ 54' 23.65''$

$\Delta_{10} = 9^\circ 55' 47.01''$

$\Delta_{11} = 10^\circ 57' 10.37''$

check $\frac{\phi}{2} = \frac{20^\circ 40'}{2}$

$10^\circ 20'$

(1) Question No # (03)

Problem:

Solution:

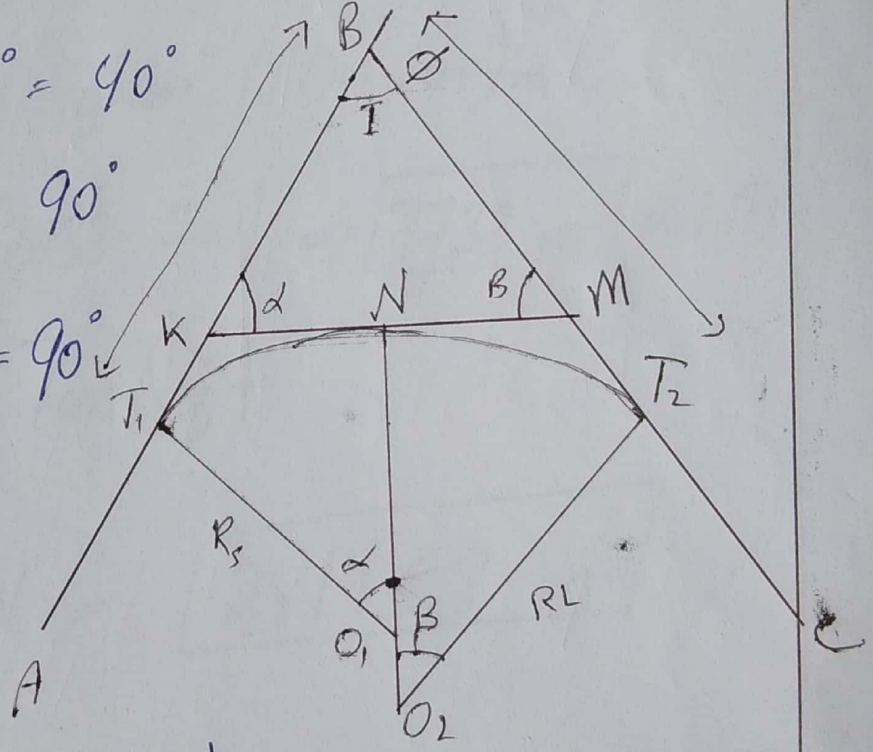
ID = 7933

$\alpha = 180° - 130° = 50°$

$\beta = 180° - 140° = 40°$

$\phi = \alpha + \beta \Rightarrow 90°$

$I = 180° - 90° = 90°$



$KT_1 = KN = R\left(\tan\left(\frac{\alpha}{2}\right)\right) \Rightarrow (1)$

1st arc is given (ID - 300)

$\Rightarrow (7933 - 300) \Rightarrow$ **7633 m** put (1)

(2)

$$KN = R_S \tan\left(\frac{\alpha}{2}\right) \Rightarrow 7633 \tan\left(\frac{50^\circ}{2}\right)$$

$$KT_1 = KN \Rightarrow \boxed{3559.32\ m}$$

$$MT_2 = MN = RL \tan\left(\frac{\beta}{2}\right) \rightarrow (11)$$

2nd Arc is given $(ID - 200)m$

$$\Rightarrow (7933 - 200) \Rightarrow \boxed{7733\ m}$$ Put (11)

$$MN = 7733 \tan\left(\frac{40}{2}\right)$$

$$MT_2 = MN = \boxed{2814.58\ m}$$

$$KM = KN + MN \Rightarrow 3559.32 + 2814.58$$

$$\boxed{KM = 6373.90\ m}$$

(3)

Find ΔBkM, by Sin rule.

$$\frac{Bk}{\sin\beta} = \frac{kM}{\sin(I)}$$

$$Bk = \frac{kM \sin\beta}{\sin(I)} \Rightarrow \frac{6373.9 \times \sin(40^\circ)}{\sin(90^\circ)}$$

$$\boxed{Bk = 4097.063 \text{ m}}$$

$$\frac{BM}{\sin\alpha} = \frac{kM}{\sin I}$$

$$BM = \frac{kM \times \sin\alpha}{\sin(I)} \Rightarrow \frac{6373.9 \times \sin(50^\circ)}{\sin(90^\circ)}$$

$$\boxed{BM = 4882.69 \text{ m}}$$

(4)

$$TL = kT_1 + Bk = 3559.32 + 4097.063$$

$$\boxed{TL = 7656.383\ m}$$

$$T_S = MT_2 + BM = 2814.58 + 4882.69$$

$$\boxed{T_S = 7697.27\ m}$$

$$L_S = \frac{\pi R_S \alpha}{180} \Rightarrow \frac{\pi \times 7633 \times 50}{180^\circ}$$

$$\boxed{L_S = 6657.67\ m}$$

$$L_L = \frac{\pi R_L \beta}{180} \Rightarrow \frac{\pi \times 7733 \times 40}{180^\circ}$$

$$\boxed{L_L = 5395.91\ m}$$

(5)

⇒ Chainage of intersection Point = (10-400) m

⇒ 7933-400

⇒ **7533 m**

Chainage of intersection Point - T_L

7533 - 7656.383

T_1 ⇒ **-121.383 m**

⇒ Plus S = -121.383 m
6657.67 m

6536.287 m

⇒ Chainage of compound curvature (N) Plus L_L

6536.287 m
5395.91 m

11932.197 m

⇒ T_2 =