Subject:-

Advance Engineering Survey

Submitted BY

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ID# 7910

Submitted To:-

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Q No-1 (Part-A)

Ans (1)

Tangent meet at chainage = 7910

Deflection angle = 14° 13' 23"

Degree of curve = 5°

Sol:-

$$D = 5^\circ$$

$$R = \frac{5729.58}{D}$$

$$= \frac{5729.58}{5ft} = 1145.91$$

Tangent length $= BT_1 = BT_2 = R\tan\left(\frac{\Delta}{2}\right)$

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

$$BT_1 = BT_2 = 142.96 ft$$

Length of curve:-

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

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

$$L = 284.45 ft$$

Chainage of Intersection point = 7910 ft (2)

Minus tangent length = − 142.96

Chainage of T_1 = 7767.04

Plus L = 284.45 ft

Chainge of T_2 = ~~8199.49~~ 8051.49

Length of Chord = I

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

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

$$= 283.72 \text{ ft}$$

Mid. Co-ordinate:-

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

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

$$= 8.81 \text{ ft}$$

External Distance:-

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

$$1145.91\left(\sec\left(\frac{14°13'23''}{2}\right) - 1\right) = 8.88 \text{ ft}$$

(Part- B)

ID = 7910 (3)

offset No	offset	Simpson Multiplied	Product
0	7.910	1	7.910
30	16.910	4	43.64
60	11.910	2	23.82
90	5.910	4	23.64
120	3.910	2	7.82
150	4.910	1	4.91
			Σ = 111.74

Area $(h_1 - h_6)$

$\Rightarrow 5/3 \times 111.74$

$\Rightarrow 30/3 \times 111.74$

$= 1117.4$

Q No- 02

Given Data:-

(4)

Circular radius = 7910 - 7630

Assume value = 7630

$\Rightarrow$ 280 m

Deflection angle = 20° 40'

Point of intersection = 7910 - 5477

Assume value = 5477

$\Rightarrow$ 2433m

Interval

Sol:-

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

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

$BT_1 = BT_2 = 560 \tan\left(\frac{20°40'}{2}\right)$

$\Rightarrow 102.10\ m$

Length of curve:-

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

$L = \frac{\pi 560\ \ 20°40'}{180}$

$L = 201.70\ m$

Chainage of Point of intasection
$\Rightarrow$ 2433m

(5)

Minus tangent = -102.10

Chainage of T_1 = 2330.9m

Plus L = 201.70

Chainage of T_2 = 2532.6m

Length of 1st chord = C_1

Assume value = 2345

$\Rightarrow$ 2345 - 2330.9

C_1 = 14.1m

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

$C_{11} = 2532.6 - 2515$

$C_{11} = 17.6$ m

By deflection Method:-

$$S_1 = \frac{1718.9 \times C_1}{60R} = \frac{1718.9 \times 14.1}{60 \times 560}$$

$S_1 = 0°43'16.77''$

$$S_2 = \frac{1718.9 \times 20}{60 \times 560} = 1°1'23.36''$$

$S_2 = S_3 = S_4 = S_5 = S_6 = S_7 = S_8 = S_9 = S_{10}$

$$S_{11} = \frac{1718.9 \times 17.6}{60 \times 60}$$

$S_{11} = 0°54'1.35''$

(6)

Total deflection (tangential) angle for the chord is

$\Delta_1 = S_1 = 0°43'16.77''$

$\Delta_2 = S_1 + S_2 = 0°43'16.77'' + 1°1'23.36''$

$\Rightarrow 1°44'40.13''$

$\Delta_3 = 2°46'3.49''$

$\Delta_4 = 3°47'26.85''$

$\Delta_5 = 4°48'50.21''$

$\Delta_6 = 5°50'13.57''$

$\Delta_7 = 6°51'36.93''$

$\Delta_8 = 7°53'0.29''$

$\Delta_9 = 8°54'23.65''$

$\Delta_{10} = 9°55'47.01''$

$\Delta_{11} = 10°57'10.37''$

Check $\frac{\Phi}{2} = \frac{20°40'}{2}$

$= 10°20'$

Q No- 03

Problem (7)

Sol:- ID = 7910

$\alpha = 180° - 130° = 50°$

$\beta = 180° - 140° = 40°$

$\phi = \alpha + \beta = 90°$

$I = 180° - 90° = 90°$

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

1st arc is given (ID - 300)

$\Rightarrow (7910 - 300) \Rightarrow 7610$

$KN = R\tan\left(\frac{\alpha}{2}\right) = 7610 \tan\left(\frac{50°}{2}\right)$

$KT_1 = KN = 3548.60$

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

2nd arc is given

$7910 - 200 \Rightarrow 7710$ m

Put in eq (ii)

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$$MN = 7710 \tan\left(\frac{40}{2}\right)$$

$$MT_2 = MN = 2800.75\ m$$

$$KM = KN + MN = 2800.75 + 3548.60$$

$$KM = 6349.35\ m$$

find ΔBKM, by Sin Rule

$$\frac{BK}{\sin\beta} = \frac{KM}{\sin(I)}$$

$$BK = \frac{KM \sin\beta}{\sin(I)} \Rightarrow \frac{6349.35 \times \sin(40^\circ)}{\sin(90^\circ)}$$

$$\Rightarrow 4076.78$$

$$BM = \frac{KM \times \sin\alpha}{\sin(I)} \Rightarrow \frac{6349.35 \times \sin(50)}{\sin(90)}$$

$$BM \Rightarrow 4863.88\ m$$

$TL = KT_1 + BK = 3548.60 + 4076.78$

$TL = 7625.38$ (9)

$TS = MT_2 + BM = 2800.75 + 4863.88m$

$\Rightarrow 7664.63$

$Ls = \frac{\pi R S\alpha}{180} = \pi \times \frac{7610 \times 50}{180}$

$Ls = 6640.9778$

$L_2 = \frac{\pi R L \beta}{180} = \frac{\pi \times 7710 \times 40}{180}$

$L_2 = 5382.59$

Chainage of Intersection point

$\Rightarrow (ID - 400)\ m$

$\Rightarrow 7910 - 400 = 7510\ m$

Chainage of intersection Point - T_L

$\Rightarrow 7510 - 7625.38$

$T_1 \Rightarrow -115.38$

Plus $S = -115.38 + 6640.9778 = 6525.6$

Chainage of compound curvature (N)

Plus $L_L \Rightarrow 6525.6 + 5382.59$

$T_2 \Rightarrow 11908.19$