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Section : B

Subject : Advanced Engg Survey

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Q.No 1 :-

Part = A :-

Tanget meet at chainage = 7936 ft

Deflection angle = 14°13'2"

Degree of curve = 5°

Solution :-

$$D = 5^\circ$$

$$R = 5729.58/D$$

$$= \frac{5729.58}{5^\circ}$$

$$= \boxed{1145.917.}$$

Tanget length = $BT_1 = BT_2 = R \tan(\Delta/2)$

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

$BT_1 = BT_2 =$ **142.967ft**

Length of Curve =

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

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

$L =$ **284.45ft**

Chainage of intersection Point =

= 7936

minos tangent length = - 142.96 ft

Chainage of T_1 = + 7793.04

Plus L = + 284.45 ft

Chainage of T_2 = 8077.49

Length of chord = l =

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

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

$= \boxed{283.72 \text{ ft}}$

Mid ordinat:

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

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

$= \boxed{8.81 \text{ ft.}}$

External distance.

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

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

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

Q No 1

Part = B:-

first offset = 7936 = 7936/1000 = 7.936

Chainage(m)	0	30	60	90	100	150
offset(m)	7.936	7.936+3 = 10.936	7.936+4 = 11.936	7.936-2 = 5.936	7.936-4 = 3.936	7.936-3 = 4.936

Here we have 6 offset & 6 intercepts. and his Simpson one third rule.

offset No	offsets	Simpson multiplier	product
1	7.936	1	7.936
2	10.936	4	43.744
3	11.936	2	23.872
4	5.936	4	23.744
5	3.936	2	7.872
6	4.936	1	4.936
			Σ = 112.104

Area $(h_1 - h_6)$

$= b/3 \times 112.104$

$= 30/3 \times 112.104$

T. Area = 1121.04 m.

Q No: 2:-

Given data:-

Circular radius = assumption value

Circular radius = 7636 - 7300

= 336

Deflection angles = 20°40'

Point of intersection = 7636 - 5500 (assumption value)

= 2136

Interval = 20m

Solution:-

$R = 336 \times 2 = 672$

$BT_1 = BT_2 = R \tan \Phi/2$

$BT_1 = BT_2 = 672 \tan \frac{20°40'}{2}$

$BT_1 = BT_2 = 122.52m$

Length of curve:-

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

$$= \frac{\pi \times 672 \times 20^\circ 40'}{180'}$$

$$= 242.39m$$

Change of Point of intersection

= 2136 m

minus target = -122.52m

Chainage of T_1 = 2013.48 m

Plus L = + 242.39m

Chainagee of T_2 = 2255.87m

Length of 1st chord C_1

assumption value

= 2033 - 2013.48

= 19.52m

$C_2 = C_3 = C_4 = C_4 = C_5 = C_6 = C_7 = C_8 = C_9$

$C_{11} = 2255.87 - 2238$ → assumption value

$= \underline{17.87\,m}$

By deflection method :-

$$\delta_1 = \frac{1718.9 \times C_1}{60R} \text{ (degree)}$$

$$\delta_1 = \frac{1718.9 \times 19.52}{60(672)}$$

$$\delta_1 = \underline{0°49'55.8''}$$

$$\delta_2 = \frac{1718.9 \times 20}{60(672)}$$

$$= \underline{0°51'9.46''}$$

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

$$\delta_{11} = \frac{1718.9 \times 18.40}{6(672)}$$

$$\delta_{11} = 0°45'42.57''$$

Total deflection angle for the chord is;

$\Delta_1 = \delta_1 = 0°49'55.8''$

$\Delta_2 = \delta_1 + \delta_2 = 0°49'55.8'' + 0°51'8.46''$

$\Delta_2 = 1°41'5.26''$

$\Delta_3 = 2°32'11.72''$

$\Delta_4 = 3°23'21.18''$

$\Delta_5 = 4°14'30.64''$

$\Delta_6 = 5°51'40.10''$

$\Delta_7 = 6°42'49.56''$

$\Delta_8 = 7°33'58.02''$

$\Delta_9 = 8°25'8.48''$

$\Delta_{10} = 9°16'17.94''$

$\Delta_{11} = 10°7'27.40''$

Check $\Phi/2 = \frac{20°40'}{2}$

$= 10°20'$

Q = 3:-

Given data:-

$\Delta AKM = 130^\circ$

$\Delta KMC = 140^\circ$

1st arc radius = (7936 - 300) = 7636m

2nd arc radius = (7936 - 200) = 7736m

Change of intersetion point = (7936 - 400) = 7147m

Resuried:-

Tangent point = ?

Compound curvature = ?

Solution:-

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

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

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

$I = 180 - \phi$

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

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

$$= 7636 \tan(50/2)$$

$$= \boxed{3560.72\text{m}}$$

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

$$= 7736 \tan(40°/2)$$

$$= \boxed{2815.67}$$

$$MN = MT_2 + MN$$

$$= 3560.72 + 2815.67$$

$$= \boxed{6376.39}$$

Now by **Sin rule:-**

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

$$BK = \frac{MK \sin\beta}{\sin(I)} = \frac{6376.39 \sin 40°}{\sin 90°}$$

$$= \boxed{4098.66\text{m}}$$

$$BM = \frac{mk\sin\alpha}{\sin(I)} = \frac{6376.39\sin 50^\circ}{\sin 90^\circ}$$

$$BM = 4884.59\,m$$

$$T_L = kT_1 + BK = 3560.72 + 4098.66$$

$$= 7659.38m$$

$$T_S = mT_2 + BM = 2815.67 + 4884.59$$

$$= 7700.26$$

$$L_L = \frac{\pi R_L \alpha}{180^\circ} = \frac{\pi \times 7636 \times 50}{180^\circ}$$

$$= 6663.66$$

$$L_S = \pi R_S B = \frac{\pi \times 7736 \times 40}{180^\circ}$$

$$= 5400.74m$$

⇒ Chainage of intersection point = 7556

⇒ Chainage of intersection point :

$-T_L = -7659.38$.

⇒ Chainage of T_1 = -123.38

⇒ Plus L = $+6663.66$

= 6540.28m

⇒ Chainge of compound (N) Plus Ls = $+5400.74$

⇒ Chainge of T_2 = 11941.02m