

ADVANCED ENGINEERING

SURVEY

7957

B.

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Q No 1 (a)

①

Target meet at change =

$$79577t$$

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

Degree of curve = 5°

Sol:-

$$D = 5^{\circ}$$

$$R = 5729.58/D$$

$$= 5729.58/5$$

$$= 1145.917t$$

Tangent Length $\cdot BT_1 = BT_2 = R \tan \phi/2$

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

$$BT_1 = BT_2 = 142.967t$$

Length of curve = L

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

$$L = 284.4571$$

Chainage of intersection ⁽²⁾

$$7957.7t$$

$$\text{minus tangent} = -142.967t$$

$$\text{chainage of } T_1 = 781.047t$$

$$\text{Plus } L = 284.457t$$

$$\text{chainage of } T_2 = 8098.497t$$

Length of chord

$$= 2R \sin\left(\frac{\theta}{2}\right)$$

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

$$= 283.727t$$

Mid ordinate

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

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

$$= 8.817t$$

External Distance

③

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

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

$$= 808871$$



(4)

Q No 1 (b)

off set	offset	Simpson Multiplier	product
1	7.957	1	7.957
2	10.957	4	43.828
3	11.957	2	23.914
4	6.957	4	27.828
5	3.957	2	7.914
6	4.957	1	4.957

$$\begin{aligned} \text{Area } (h_1 - h_n) &= b/3 \times 112.392 \\ &= \frac{30}{3} \times 112.392 \end{aligned}$$

$$\text{Area} = 1123.92 \text{ m}^2$$

Q No 2 (c)

$$\begin{aligned} \text{Circular radius} &= 7957 - 7670 \\ &= 287 \text{ m} \end{aligned}$$

$$\text{Deflection angle} = 20^\circ 40'$$

$$\begin{aligned} \text{Point of intersection} &= 7957 - 5000 \\ &= 2957 \text{ m} \end{aligned}$$

$$\text{Interval} = 20 \text{ m}$$

Sols-

(5)

$$R = 287 \times 2 = 574 \text{ m}$$

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

$$574 \tan \frac{20^\circ 40'}{2}$$

$$= 104.65 \text{ m}$$

Length of curve

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

$$L = \frac{\pi \times 574 \times 2040}{180}$$

$$L = 207.04$$

chainage of Point of intersection =
2957 m

Minus tangent = -104.65 m

chainage of T_1 = 2852.35 m

Plus L = 207.04 m

chainage of T_2 = 3059.39 m

Length of 1st chord $\cdot C_1$ ⁽⁶⁾

$$= 2870 - 2852.35 \text{ cm}$$

$$= 17.65 \text{ m}$$

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

$$C_{11} = 3059.35 - 3040$$

$$= 19.35$$

By deflection Method

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

$$S_1 = \frac{1718 \times 17.65}{60(574)} = 0^\circ 52' 51.28''$$

$$S_2 = \frac{1718 \times 20}{60(574)} = 0^\circ 59' 53.52''$$

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

$$S_{11} = \frac{1718 \times 19.35}{60(574)} = 0^\circ 57' 38.73''$$

Total deflection tangent angle

for chord i is j

(7)

$$\Delta_1 = S_1 = 0^\circ 52' 51.28''$$

$$\Delta_2 = \Delta_1 + S_2 = 1^\circ 52' 44.8''$$

$$\Delta_3 = 2^\circ 52' 38.32''$$

$$\Delta_4 = 3^\circ 52' 31.84''$$

$$\Delta_5 = 4^\circ 52' 25.36''$$

$$\Delta_6 = 5^\circ 52' 11.41''$$

$$\Delta_7 = 6^\circ 52' 11.41''$$

$$\Delta_8 = 7^\circ 52' 4.93''$$

$$\Delta_9 = 8^\circ 51' 58.43''$$

$$\Delta_{10} = 9^\circ 51' 51.97''$$

$$\Delta_{11} = 10^\circ 49' 48.7''$$

$$\text{check } \frac{20^\circ 46'}{2} =$$

$$= 10^\circ 23'$$

Q NO 36 (8)

Given Data

$$\Delta AKM = 130^\circ$$

$$\Delta KMC = 140^\circ$$

$$\text{1st arc radius} = (7957 - 300) = 7657\text{m}$$

$$\text{2nd arc radius} = (7957 - 200) = 7757\text{m}$$

$$\begin{aligned} \text{chainage of intersection (7957-400)} \\ = 755.7\text{m} \end{aligned}$$

Sols-

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

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

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

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

$$KT_1 = KN = R_1 \tan\left(\frac{\alpha}{2}\right) =$$

$$= 7657 \tan\left(\frac{50^\circ}{2}\right) = 3570.51\text{m}$$

$$KT_2 = MT_2 = R_2 \tan\left(\frac{\beta}{2}\right)$$

$$= 7757 \tan\left(\frac{40^\circ}{2}\right) = 2823.31$$

$$KM = MT_2 + KT_1 = 3570.51 + 2823 = 6393.22$$

Now,

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

$$BK = \frac{6393 \times \sin 40^\circ}{\sin 90} = 4109.86 \text{ m}$$

$$BM = \frac{6393.82 \times \sin 50^\circ}{\sin 90} = 4897.95 \text{ m}$$

$$T_2 = KT_1 + BK = 3570.51 + 4109.86 = 7680.37 \text{ m}$$

$$T_3 = MT_2 + BM = 2823.31 + 4897.95 = 7721.26 \text{ m}$$

$$L_2 = \frac{\pi R L_2 \alpha}{180} = \frac{\pi \times 7657 \times 50}{180} = 6681.99 \text{ m}$$

$$L_3 = \frac{\pi R L_3 \beta}{180} = \frac{\pi \times 7757 \times 40}{180} = 5415.40$$

chainage of intersection point = 7557 m

$$\text{minus } T_2 = -7680.37 \text{ m}$$

$$\text{chainage of } T_1 = -123.37 \text{ m}$$

$$\text{Plus } L_2 = +6681.99 \text{ m}$$

$$655.862 \text{ m}$$

chainage of compared curvature plus L_s (10)
= 5415.40m

chainage of T_2 = 11974.02m

