Exam # Mid term

Subject # Advanced Engineering Survey

ID # 7964

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Q No 1 Part 'A'

Tanget meet at chainge = 7964ft

Deflection angle = 14°13'23"
Degree of Curve = 5°

Solution:-

$D = 5^\circ$

$R = 5729.58/D$

$= 5729.58/5$

$= 1145.916ft$

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

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

$BT_1 = BT_2 = 142.86ft$

Length of Curve = L

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

$L = 284.45ft$

Chainage of Intersection = 7864 ft
minus tangent = -142.86 ft
Chainage of T_1 = 7821.04 ft

Plus L = 284.45 ft
Chainage of T_2 = 8105.48 ft

Length of chord
$= 2R \sin(\Phi/2)$
$= 2 \times 1145.91 \sin\left(\frac{14°13'23''}{2}\right)$
$= 285.72$ ft

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

External Distance:-
$R(\sec(\Phi/2) - 1)$
$1145.91(\sec\left(\frac{14°13'23''}{2}\right) - 1)$
$= 8.88$ ft

Q No 1 Part B

offset No	Offset	Simpson Multiplier	Produce
1	7.964	1	7.964
2	10.964	4	43.856
3	11.964	2	23.928
4	5.964	4	23.856
5	3.964	2	7.928
6	4.964	1	4.964

Q No :- Q 'Two'

Circular radius = 7964 - 7670
= 294 m

Deflection angle = 20°40'

Point of Intersection = 7964 - 5000
= 2964

Interval = 20m

Sol :-

R = 294 x 2 = 588 m

$$BT_1 = BT_2 = R\tan\left(\frac{\phi}{2}\right)$$

$$= 588 \tan\left(\frac{20°40'}{2}\right)$$

$$= 107.21\,m$$

Length of Curve

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

$$= \frac{\pi \times 588 \times 20°40'}{180}$$

$$= 212.05\,m$$

Chainage point of Intersection
$= 2864\,m$

minus tanget $= -107.21\,m$

Chainage of $T_1 = 2856.79\,m$
plus $L = 212.05\,m$

Chainage of $T_2 = 3068.88\,m$

Length of the 1st chord
$= 2875 - 2856.79$
$C_1 = 18.21$

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

$C_1 = 3068 - 3050$

$C_{11} = 18.88$

By deflection Method

$$\delta_1 = \frac{1718.8 \times C_1}{60R} \text{ (degree)}$$

$$\delta_1 = \frac{1718.8 \times 18.2}{60 \times 88} = 0^\circ 53' 14''$$

$$\delta_2 = \frac{1718.8 \times 20}{60(88)} = 0^\circ 58' 27.86''$$

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

$$\delta_{11} = \frac{1718 \times 18.88}{60(88)} = 0^\circ 55' 11.11''$$

By deflection (tangential) angle

For the chord 1's;

$$\Delta_1 = \delta_1 = 0^\circ 53' 14''$$

$$\Delta_2 = \Delta_1 + \delta_2 = 1^\circ 51' 41.86''$$

$\Delta_3 = 2^\circ 50' 9.92''$

$\Delta_4 = 3^\circ 48' 37.88''$

$\Delta_5 = 4^\circ 47' 5.84''$

$\Delta_6 = 5^\circ 45' 33.8''$

$\Delta_7 = 6^\circ 44' 1.76''$

$\Delta_8 = 7^\circ 42' 29.72''$

$\Delta_9 = 8^\circ 40' 57.68''$

$\Delta_{10} = 9^\circ 39' 25.64''$

$\Delta_{11} = 10^\circ 34' 37.18''$

Check =

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

$$= 10^\circ 20'$$

S.No (3)

Given Data:-

$\angle AKM = 130^\circ$

$\angle KMC = 140^\circ$

1st arc radius $= (7964 - 300) = 7664m$

2nd arc radius $= (7964 - 200) = 7764m$

Chainge of Intersection $= (7964 - 400) = 7564m$

Sol:-

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

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

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

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

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

$= 7664 \tan(\alpha/2) = 3173.78m$

$KT_2 = MT_2 = R_2 \tan(\beta/2)$

$7764 \tan(40/2) = 2825.86m$

$KM = MT_2 = KT_1 = 3173.78 + 2825.86$
$= 6388.64$

NOW

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

$BK = \frac{6388.64 \times \sin 40°}{\sin 90} = 4113.45m$

$BM = \frac{6388.64 \times \sin 50}{\sin 90} = 4802.22$

$T_L = KT_1 + BK = 3173.78m + 4113.45$
$= 7686.83$

$T_2 = MT_2 + BM = 2825.86m + 4802.22$
$= 7728.08$

$L_L = \frac{\pi R_1 \alpha}{180} = \frac{\pi \times 7664 \times 50}{180}$
$= 6688.10m$

$$L_s = \frac{\pi 12_s \beta}{180} = \frac{\pi \times 7.764 \times 40}{180}$$

$$= 5420.28m$$

Chainage of intersection

$$= 7764m$$

minus $= T_L = -7686.88m$

Chainage of $T_1 = -122.85m$

Plus $L_L = +6688.10$

$$= 6566.27$$

Chainage of Compound Curvature

Plus $L_s = 5420.28$

Chainage of $T_2 = 11986.56$