

Name

Wajeehuddin

ID

7921

Section

A

Submitted  
to

Muhammad  
Zakhan

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Q No 1

Tangent meet to  
chance = 792171

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

Degree of curve =  $5^{\circ}$

SOL

Degree =  $5^{\circ}$

$$R = 5729.58/D$$

$$= 5729.58/5 = 1145.91771$$

Tangent length =  $BT_1 = BT_2 =$

$$R \tan \frac{\phi}{2}$$

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

$$BT_1 = BT_2 = 142.9671$$

Length of curve

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

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

$$L = 284.4577$$

change of intersection

$$\text{Point} = 792177$$

$$\text{minus tangent length} = -142.9277$$

$$\text{change of } T_2 = 7283.0477$$

$$\text{plus } L = 284.4577$$

$$\text{change of } T_2 = 7567.4977$$

length of chord = l

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

$$= 283.7277$$

Mid ordinate

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

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

$$= 8.8577$$

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

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

$$= \underline{\underline{8.8877}}$$

QNO1 Part B

Offset No offset Simpson multiplier product

Offset No	offset	Simpson multiplier	product
1	7.921	1	7.921
2	10.426	4	41.704
3	11.426	2	22.852
4	5.426	4	21.704
5	3.426	2	6.852
6	4.426	1	4.426

$$\Sigma = 105.459$$

4

Area  $(h_1 - h_2)$

$$= \frac{b}{3} \times 105.459$$

$$= \frac{30}{3} \times 105.459$$

$$= 10 \times 105.459$$

$$1054.59 \text{ m}^2$$

Q no 2

Given Data

Circular radius = 7921 - 7150

Deflection angle =  $20^\circ 40'$   
771m

point of intersection = 7921 - 5000  
= 2921m

Interval = 20m

Solution  $R = 771 \times 2 = 1542$

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

$$BT_1 = BT_2 = 1542 \tan \frac{20^\circ 40'}{2}$$

$$= 1542 \tan 10^\circ 20'$$

$$= 281.15 \text{ m}$$

Length of curve

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

$$L = \frac{\pi \times 771 \times 20^\circ 40'}{180}$$

$$L = 277.57$$

change of point of intersection =

$$2426 \text{ m}$$

$$\text{minors tangent} = -100 - 64 \text{ m}$$

$$\text{change of } T_2 = 2325.36 \text{ m}$$

$$\text{plus } L = 277.57 \text{ m}$$

$$\text{change of } T_2 = 2524.467 \text{ m}$$

largest length of 1st chord =  $L_1$

$$2340 - 2325.60$$

$$= 14.4m$$

$$L_2 = L_3 = L_4 = L_5 = L_6 = L_7 = L_8 = L_9 = L_{10} = 20m$$

$$L_{11} = 2534.467 - 2510$$

$$L_{11} = 14.467$$

By deflection method

$$\delta_1 = \frac{1718.9 \times L_1 \text{ (degree)}}{60R}$$

$$\delta_1 = \frac{1718.9 \times 14.4}{60 \times 771}$$

$$\delta_1 = \frac{24752.16}{60 \times 771} = \frac{24752.16}{46260}$$

$$\delta_1 = \cancel{0^\circ 35' 00''} \quad 0^\circ 0' 37.42''$$

$$\delta_2 = \frac{1718.9 \times 20}{60 \times 771} = \frac{34378}{46260}$$

$$\delta_2 = \cancel{0^\circ 44' 35.33''}$$

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

$$\delta_{11} = \frac{1718.9 \times 14.467}{60 (771)}$$

$$\delta_{11} = 0^\circ 32' 9.85''$$

Total deflection (tangential) angle for the chord is

$$\Delta_1 = \delta_1 = 0^\circ 0' 37.42''$$

$$\Delta_2 = \delta_2 = ~~0^\circ 0' 37.42''~~ 0^\circ 45' 35.33''$$

$$\Delta_3 = \delta_3 = 0^\circ 45' 12.75''$$

$$\Delta_4 = \delta_4 = 1^\circ 29' 48.08''$$

$$\Delta_5 = \delta_5 = 2^\circ 15' 08.3''$$

$$\Delta_6 = \delta_6 = 3^\circ 44' 56.38''$$

$$\Delta_7 = \delta_7 = 4^\circ 0' 4.58''$$

$$\Delta_8 = \delta_8 = 5^\circ 45' 0.96''$$

$$\Delta_9 = \delta_9 = 6^\circ 39' 3.10''$$

$$\Delta_{10} = \delta_{10} = 10^\circ 45' 8.18''$$

$$\frac{20^\circ 40' \quad 10^\circ 20'}{2}$$

2



Q No 3

Given Data

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

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

$$\text{1st arc radius} = (7921 - 300) = 7621 \text{ m}$$

$$\text{2nd arc radius} = (7921 - 200) = 7721 \text{ m}$$

$$\text{Chaise of intersection} = 7921 - 400 = 7521 \text{ m}$$

Solution

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

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

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

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

$$KT_1 = KN_1 = R_1 \tan\left(\frac{\alpha}{2}\right)$$

$$= 7621 \tan\left(\frac{50^\circ}{2}\right)$$

$$3048.4 \text{ m}$$

$$KT_2 = KN_2 = R_2 \tan\left(\frac{\beta}{2}\right)$$

$$= 7721 \tan\left(\frac{40^\circ}{2}\right)$$

$$2779.56 \text{ m}$$

$$KM = NT_2 + KT_1 = 3048.4 + 2779.56$$

$$= 5827.96 \text{ m}$$

Now

Bk = r - 11e Sin B

$$Bk = \frac{5827.96 \times \sin 30^\circ}{\sin 90^\circ} = 3496.77 \text{ m}$$

$$Bm = \frac{5827.96 \times \sin 30^\circ}{\sin 90^\circ} = 4079.52 \text{ m}$$

$$T_2 = KT_1 + Bk = 3048.4 + 3496.77 = 6545.17 \text{ m}$$

$$T_3 = MT_2 + Bm = 2779.56 + 4079.52 = 6859.08$$

$$L_1 = \frac{\pi R_1 \alpha}{180} = \frac{\pi \times 7621 \times 40}{180} = 6650.57 \text{ m}$$

$$L_2 = \frac{\pi R_2 \beta}{180} = \frac{\pi \times 7721 \times 40}{180} = 5390.27 \text{ m}$$

change of intersection point  
7621

$$-T_2 = -6545.17 \text{ m}$$

$$\text{change of } T_1 = -122.95 \text{ m}$$

$$\text{plus } L_1 = 6650.57 \text{ m}$$

$$\text{change of compound curve} = 6095.65 \text{ m}$$

$$\text{plus } L_2 = 5390.27 \text{ m}$$

