NAME: Khushal Khan

ID: 7505

SECTION: B

Subject: Advance Engg. Survey

Teacher: Engg Abdul Farhan

Q1 (a):

Given data:

Tangent meet at chainage = 7505

Deflection angle = 14° 13' 23"

Degree of curve = 5°

Sol:

$D = 5^\circ$

$R = 5729.58/5 = 1145.916 ft$

Tangent length = $R\,Tan(\Phi/2)$

$BT_1 = BT_2 = 1145.916 (Tan)\left(\frac{14^\circ 13' 23''}{2}\right)$

$BT_1 = BT_2 = 142.96$

Now length of Curve = $L = \frac{\pi R \Phi}{180}$

$= \frac{3.14 (1145.916)(14^\circ 13' 23'')}{180^\circ}$

$L = 284.31 ft$

chainage at B = 7505

Minus Tangent length = -142.96

chainage of T_1 = 7364.04

plus L = 284.31

chainage of T_2 = 7646.35

length of chord = $I = 2R\,Sin(\Phi/2)$

$= 2(1145.916)\,Sin\left(\frac{14^\circ 13' 23''}{2}\right)$

$= 283.73 ft.$

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

$= 1145.916\left(1-\cos\left(\frac{14°13'23''}{2}\right)\right)$

$= 8.82$ ft

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

$= 1145.916\left(\sec\left(\frac{14°13'23''}{2}\right)-1\right)$

$= 8.88$ ft.

Q1 (b)

OFFSET NO	OFFSET	Simpson Multiplier	product
1	7.505	1	7.505
2	10.505	4	42.02
3	11.505	2	23.01
4	5.505	4	22.02
5	3.505	2	7.01
6	4.505	1	4.505
			106.07

Area $(h_1 - h_6)$

$= b/3 \times 106.07$

$= 30/3 \times 106.07$

Total area $= 1060.7\ m^2$

Q2:

Given data:

circular radius.

7505 - 7250 = 255m

Deflection angle = 20°40'

point of intersection: 7505 - 5000

= 2505m

interval = 20m.

Sol:

2

$R = 255 \times 2 = 510$

$BT_1 = BT_2 = R\,Tan\,\Phi/2$

$= 510\,Tan\,(20°40'/2)$

$BT_1 = BT_2 = 92.98\,m$

length of curve $= L = \pi R \Phi/180$

$= \frac{3.14(510)(20°40')}{180}$

$= 183.86\,m$

chainage of point of intersection = 2505

Minus Tangent = 92.98

Chainage of T1 = 2413.02

Plus $L = 183.86$

Chainage of $T_2 = 2595.88$.

length of chord 1st $= C_1 = 2460 - 2443.02$

$= 16.56$

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

$C_{10} = 2648.40 - 2630$

$= 18.40m$

By deflection Method

$$\delta_1 = \frac{1718.9 \times C_1}{60R}$$

$$= \frac{1718.9 \times 16.56}{60(510)}$$

$\delta_1 = 0^\circ 55' 48.82''$

$$\delta_2 = \frac{1718.9 \times 20}{60 \times 510}$$

$\delta_2 = 1^\circ 7' 24.47''$

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

$$\delta_{11} = \frac{1718.9 \times 18.40}{60(510)}$$

$$\delta_{11} = 1^\circ 2' 0.91''$$

Total deflection angle for chord is

$\Delta_1 = \delta_1 = 0^\circ 55' 48.82''$

$\Delta_2 = \delta_1 + \delta_2 = 1^\circ 7' 24.47'' + 0^\circ 55' 48.82''$

$\Delta_2 = \delta_2 = 2^\circ 3' 12.47''$

$\Delta_3 = 2^\circ 51' 9.82''$

$\Delta_4 \quad 3^\circ 51' 41.3''$

$\Delta_5 \quad 4^\circ 52' 12.78''$

$\Delta_6 \quad 5^\circ 52' 44.26''$

$\Delta_7 \quad 6^\circ 53' 15.76''$

$\Delta_8 \quad 7^\circ 53' 47.22''$

$\Delta_9 \quad 8^\circ 54' 18.7''$

$\Delta_{10} \quad 9^\circ 54' 50.18''$

$\Delta_{11} \quad 10^\circ 50' 31.34''$

Check $\phi/2 = 20^\circ 40'$

$$\frac{}{2}$$

$$\boxed{1 = 10^\circ 20'}$$

Q3

(8)

Given data:

$\Delta AKM = 130°$

$\Delta KMC = 140°$

1st Arc radius = 7505 - 300 = 7205 m

2nd Arc radius = 7505 - 200 = 7305 m

Chainage of intersection point = 7505 - 400 = 7105 m

Required = Tangent points = ?

Compound curvature = ?

Sol:

$\alpha = 180° - 130° = 50°$

$\beta = 180° - 140° = 40°$

$\phi = \alpha + \beta = 90°$

$I = 180 - \phi = 180° - 90° = 90°$

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

$= 7205 \tan(50°/2)$

$KT_1 = KN = 3359.74 m$

$$MN = MT_2 = R\,Tan(\Delta/2)$$

$$= 7305\,Tan(40°/2)$$

$$= 2658.80\,m$$

$$KM = MT_2 + KT_1 = 3359.74 + 2658.80$$

$$KM = 6053.91\,m$$

$$KM = 6018.54\,m$$

Now

$$\frac{BK}{MK\,Sin\beta} = \frac{1}{Sin I}$$

$$BK = \frac{MK\,Sin\beta}{Sin I} = 6018.54\,Sin$$

$$BK = \frac{KM\,Sin\beta}{Sin I} = \frac{6018.54\,Sin\,40°}{Sin 90} = 3868.64$$

$$BM = \frac{KM\,Sin\alpha}{Sin I} = \frac{6018.54\,Sin\,50°}{Sin 90} = 4610.46$$

$$TL = KT_1 + BK = 3359.74 + 3868.64 = 7228.38$$

$$T_S = MT_2 + BM = 2658.80 + 4610.46 = 7269.26$$

$$L_L = \frac{\pi R_L \alpha}{180} = \frac{\pi\,7205 \times 50'}{180} = 6284.36$$

$$L_S = \frac{\pi R_S \beta}{180} = \frac{\pi\,7305\,40'}{180} = 5097.26$$

Chainage of intersection point = 7105

Minus T_L = 7228.38

chainage of T_1 = -123.38

Plus L = + 6284.36

= 6160.98m

chainage of compound Curvature

(N) plus L_S = ~~8[illegible]m~~ 5097.26

chainage of T_2 = 11258.24 m.