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ID 7895

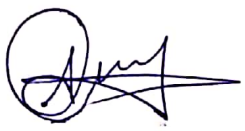
Section A

Semister 4th

Subject Advance Engineering Survey (Theory)

Date 25-April-2020

Dept Civil Engineering

Student Signature 

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Q No 01 Part (a)

Ans

Tangent meet at chainage = 7895ft

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

Degree of curve = 5°

Sol :-

$$D = 5^\circ$$

$$R = \frac{5729.58}{D}$$

$$= \frac{5729.58}{5ft}$$

$$= 1145.91$$

Tangent length $= BT_1 = BT_2 = R\tan\left(\frac{\Delta}{2}\right)$

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

$$BT_1 = BT_2 = 142.96\,ft$$

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Length of curve:

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

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

$$L = 284.45 \text{ ft}$$

Chainage of Intersection point = 7895 ft

Minus tangent length = -142.96

Chainage of T_1 = 7752.04

Plus L = 284.45 ft

Chain of T_2 = 8036.49

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Length of Chord = I

$$\Rightarrow 2R\sin\left(\frac{\Phi}{2}\right)$$

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

$$= 283.72\,ft$$

Mid ordinate

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

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

$$= 8.81\,ft$$

External distance

$$R\left(\sec\left(\frac{\Phi}{2}\right) - 1\right)$$

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

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

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(4)

Part (B)

ID = 7895

Offset No	Offset	Simpson Multiplied	Product
0	7.895	1	7.895
30	10.895	4	43.58
60	11.895	2	23.79
90	5.895	4	23.58
120	3.895	2	7.79
150	4.895	1	4.895

$\Sigma = 111.53$

Area $(h_1 - h_6)$

$\Rightarrow \frac{b}{3} \times 111.53$

$\Rightarrow \frac{30}{3} \times 111.53$

$\Rightarrow \boxed{1115.3}$

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Q No 02

Given data:

Circular radius = 7895 - 7615

Assume value = 7615

=> 280 m

Deflection angle = 20° 40'

Point of intersection = 7895 - 5462

Assume value = 5462 m

=> 2433 m

interval = 20m

Sol:- R = 280 x 2 = 560 m

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

$BT_1 = BT_2 = 560 \tan \frac{20° 40'}{2}$

=> 102.10 m

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Length of curve

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

$$L = \frac{\pi \times 560 \times 20^{\circ} 40'}{180}$$

$$L = 201.70 \text{ m}$$

Chainage of point of intersection = 2433 m

minus tangent = -102.16

chainage of T_1 = 2330.9m

plus L = 201.70

chainage of T_2 = 2532.6m

Length of 1st chord = C_1

Assume value = 2345

$\Rightarrow$ 2345 - 2330.9

C_1 = 14.1m

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

$C_{11} = 2532.6 - 2515$

$C_{11} = 176\ m$

By deflection Method

$$S_1 = \frac{1718.9 \times C_1}{60\ R.}$$

$$\Rightarrow \frac{1718.9 \times 14.1}{60 \times 560}$$

$$\boxed{S_1 = 0^\circ 43' 16.77''}$$

$$S_2 = \frac{1718.9 \times 20}{60 \times 560}$$

$$\boxed{S_2 = 1^\circ 1' 23.36''}$$

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

$$S_{11} = \frac{1719.9 \times 17.6}{60 \times 560}$$

$= 0° 54' 1.35''$

Total deflection (tangential) angle for the chord is,

$\Delta_1 = S_1 = 0° 42' 16.77''$

$\Delta_2 = S_1 + S_2 = 0° 43' 16.77'' + 1° 1' 23.36''$

$\Rightarrow \boxed{1° 44' 40.13''}$

$\Delta_3 = 2° 46' 3.49''$

$\Delta_4 = 3° 47' 26.85''$

$\Delta_5 = 4° 48' 50.21''$

$\Delta_6 = 5° 50' 13.57''$

$\Delta_7 = 6° 51' 36.93''$

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$\Delta 8 = 7^\circ\ 53'\ 0.29''$

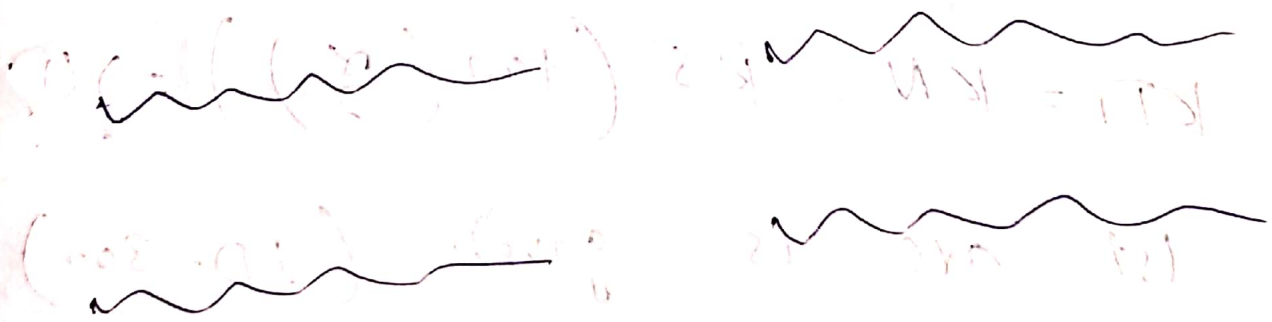
$\Delta 9 = 8^\circ\ 54'\ 23.65''$

$\Delta 10 = 9^\circ\ 55'\ 47.01''$

$\Delta 11 = 10^\circ\ 57'\ 10.37''$

check $\frac{\phi}{2} = \frac{20^\circ\ 40'}{2}$

$= 10^\circ\ 20'$



QNo. 03

Problem

Sol :- ID = 7895

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

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

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

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

$KT_1 = KN = RS\left(\tan\left(\frac{\alpha}{2}\right)\right) \Rightarrow (1)$

1st arc is given (ID - 300)

$\Rightarrow (7895 - 300) \Rightarrow$ **7595 m**

~~KT1 =~~

$KN = R S \tan\left(\frac{\alpha}{2}\right). \Rightarrow 7595 \tan\left(\frac{50^\circ}{2}\right)$

$KT_1 = KN \Rightarrow$ **3541.60 m**

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$$MT_2 = MN = RL \tan\left(\frac{\beta}{2}\right) \rightarrow (ii)$$

and Arc is given

$$(7895 - 200)m$$

$$\Rightarrow \boxed{7695\,m}$$

Put in eq (ii)

$$MN = 7695 \tan\left(\frac{40}{2}\right)$$

$$MT_2 = MN = \boxed{2800.75\,m}$$

$$KM = KN + MN \Rightarrow 2800.75 + 3541.60$$

$$\boxed{KM = 6342.35\,m}$$

Find $\triangle BKM$, by sin rule

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

$$BK = \frac{KM \sin\beta}{\sin(I)} \Rightarrow \frac{6342.35 \times \sin(40)}{\sin(90^\circ)}$$

$$\boxed{BK = 4076.78}$$

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$$BM = \frac{KM \times \sin\alpha}{\sin(I)} \Rightarrow \frac{6342.35 \times \sin(50}{\sin(90^\circ)}$$

$$\boxed{BM = 4858.42\ m}$$

$$TL = KT_1 + BK = 3541.60 + 4076.7$$

$$\boxed{TL = 7618.38m}$$

$$T_S = MT_2 + BM =$$

$$= 2700.75 + 4858.42$$

$$\boxed{T_S = 7659.17}$$

$$L_S = \frac{\pi R S \alpha}{180} \Rightarrow \frac{\pi \times 7595 \times 50}{180^\circ}$$

$$\boxed{L_S = 6627.88\ m}$$

$$L_L = \frac{\pi R L \beta}{180} \Rightarrow \frac{\pi \times 7695 \times 40}{180^\circ}$$

$$\boxed{L_L = 5369.4\ m}$$

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Chainage of Intersection Point = (ID - 400) m

$\Rightarrow 7895 - 400$

$\Rightarrow$ **7495 m**

Chainage of intersection Point - T_L

$= 7495 - 7617.38$

$T_1 = -123.38$

$\Rightarrow$ Plus $S = -123.38 + 6627.88$

$= 6504.5$ m

Chainage of compound curvature (M) plus L_2

$6504.5 + 5369.4$

$\Rightarrow$ **$T_2 = 11873.9$ m**

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