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ID NUMBER: 7930

SECTION : "A"

SUBJECT : ADVANCED ENGINEERING SURVEY

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Question NO I

Part I

ANSWER

Solution :-

Degree = 5°

$R = 5729.58/D$

$R = 5729.58/5 \Rightarrow 1145.91$ ft

Chainage at the begining and and end of the cusue.

For finding out the chainage at the begaining and end of the cusue, tangent length and length of cusue are nessesry.

Tangent length = $R \tan \Phi/2$

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

Tangent length = 145.22 ft

NOW!

The length of curve is

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

$$= \frac{\pi \times 1145.91 \times 14°13'23''}{180}$$

$$\boxed{L = 284.46 \text{ ft}}$$

- Chainage at the begaining of the curve = 7930 - 145.22
  = 7784.78 ft
- Chainage at the end of curve
  7784.78 + 284.45
  8069.23

2 Length of long chord:

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

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

$$I = 284.73 \text{ ft}.$$

Mid ordinate and external distance:

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

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

$$\boxed{\text{Mid ordinate} = 8.815 \text{ ft}}$$

External distance:-

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

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

$$\boxed{\text{External distance} = 8.883 \text{ ft}}$$

Question NO I

Pasl NO II

ANSWER

chainage (m)	0	30	60	90	120	150
offset (m)	7.930	10.93	11.93	5.93	3.93	4.93

$\Sigma = 112.02$

Hese!

We can not use Sumpson rule because of the number of offset are even in number and the numbes of intescepts are odd, so we will first find O_5 and then O_5 and O_6.

$$A = A_1 + A_2$$

First we calculate Area b/w offset O_1 and O_5 and then A_2 b/w offset O_5 and O_6.

$$A_1 = \frac{h}{3}(O_1 + O_5 + 2(O_3) + 4(O_2 + O_4))$$

$$A_1 = \frac{10}{3}(7.930 + 3.93 + 2(11.93) + 4(10.93 + 5.93))$$

$$A_1 = 10\,(7.930 + 3.93 + 23.86 + 67.44)$$

$$\boxed{A_1 = 1031.6\ m^2}$$

NOW!

$$A_2 = \left(\frac{O_3 + O_6}{2}\right) h$$

→ h is distance b/w two offsets.

SO!

$$A_2 = \left(\frac{3.93 + 4.93}{2}\right) \times 30$$

$$\boxed{A_2 = 132.9\ m^2}$$

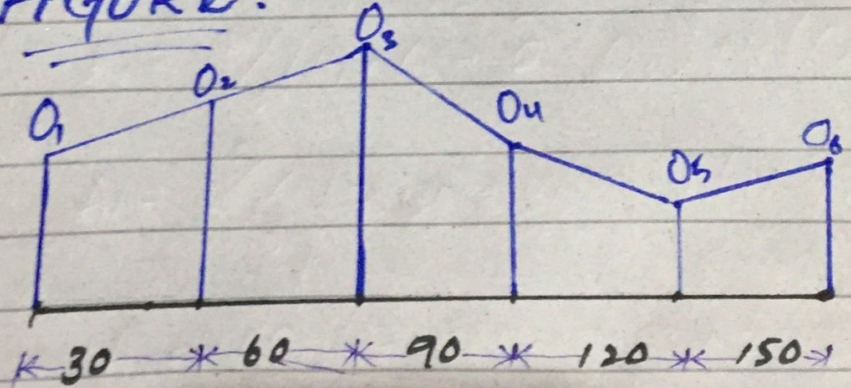
Now adding Area I and area II to get total Area.

$$A = A_1 + A_2$$

$$A = 1031.6 + 132.9$$

$$\boxed{A = 1164.5\ m^2}$$

FIGURE:



Question No 2nd:

Given data

Circular radius = 7930 - 7150

= 780 m

Deflection angle = 20°40'

Point of intersection = 7930 - 5000

= 2426 m

Interval = 20 m

Solution:

$R = 276 \times 2 = 552$ m

$BT_1 = BT_2 = R \tan \Phi/2$

$BT_2 = BT_2 = 552 \tan \frac{20°40'}{2} = 100.64$ m.

Length of curve:

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

$$L = \frac{\pi \times 552 \cdot 20°40'}{180}$$

$L = 199.107$

Chainage of point of intersection 2426 m

minus tangent = -100.64 m

Chainage of T_1 = 2325.36 m

plus L = 199.107 m

Chainage of T_2 = 2524.467 m

Length of 1st chord = C_1

= 2340 − 2325.60

= 14.4 m

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

C_{11} = 2524.467 − 2510

C_{11} = 14.467

By deflection Method

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

$$\delta_1 = \frac{1718.9 \times 14.4}{60(55^2)}$$

$$\delta_1 = 0^\circ 44' 50.45''$$

$$\delta_2 = \frac{1718.9 \times 20}{60(55^2)}$$

$$\delta_2 = 1^\circ 2' 16.74''$$

$\delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6 = \delta_7 = \delta_8 = \delta_9 = \delta_{10}$

$$\delta_{11} = \frac{1718.9 \times 14.467}{60(55^2)}$$

$\delta_{11} = 0°45'2.97''$

Total deflection (tengential) angle for the chord is:

$\Delta_1 = \delta_1 = 0°44'50.45''$

$\Delta_2 = \Delta_1 + \delta_2 = 1°47'7.19''$

$\Delta_3 = 2°49'23.93''$

$\Delta_4 = 3°51'40.67''$

$\Delta_5 = 4°53'57.41''$

$\Delta_6 = 5°56'14.15''$

$\Delta_7 = 6°58'30.89''$

$\Delta_8 = 8°0'47.63''$

$\Delta_9 = 9°3'4.37''$

$\Delta_{10} = \Delta_9 + \delta_{10} = 10°5'21.11''$

$\Delta_{11} = \Delta_{10} + \delta_{11} = 10°50'24.08''$

Cheack $= \frac{20°40'}{2} = 10°20'$

Question No 3rd

Given data:

$\Delta AKM = 130°$

$\Delta KMC = 140°$

1st arc radius = (7930-300) = 7630m

2nd arc radius = (7930-200) = 7730 m

Chainage of intersection (7930-400)

= 7530 m

Solution:

$\alpha = 180° - 130° = 50°$

$\beta = 180° - 140° = 40°$

$\phi = \alpha + \beta = 90°$

$I = 180 - \phi = 180° - 90° = 90°$

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

$= 7630 \tan\left(\frac{50°}{2}\right)$

$= 3557.92 \text{ m}$

$= 3557.92 \text{ m}$

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

$= 7730 \tan\left(\frac{40°}{2}\right)$

$= 2813.48 \text{ m}$

$KM = MT_2 + KT_1$

$= 3557.92 + 2813.48$

$= 6371.4\,m.$

NOW!

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

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

$$BK = \frac{6371.4 \times \sin 40^\circ}{\sin 90^\circ} = \boxed{4095.45\,m}$$

$T_L = KT_1 + BK = 3557.92 + 4095.45$

$= \boxed{7653.37\,m}$

~~$T_S = MT_2 + BM = 2813.48$~~

$$BM = \frac{6371.4 \times \sin 50^\circ}{\sin 90} = \boxed{4880.77\,m}$$

$T_S = MT_2 + Bm = 2813.48 + 4880.77$

$= \boxed{7694.25\,m}$

$$L_L = \frac{\pi R_L \alpha}{180} = \frac{\pi \times 7630 \times 50}{180} = \boxed{6655.05\,m}$$

$$L_S = \frac{\pi R_S \beta}{180} = \frac{\pi \times 7730 \times 40}{180} = \boxed{5393.82\,m}$$

Chainage intersection point
= 7530 m

$-T_L = -7653.37$ m

Chainage of $T_1 = -122.95$ m

Plus $L_L = +6218.60$ m

$= 6095.65$ m

Chainage of compound Cavature

plus $L_s =$ ~~[illegible]~~

$+5393.82$ m

Chainage of $T_2 =$ 11140.34 m