Name : M-SULAIMAN

ID# 7925

Subject Advance Engineering Survey

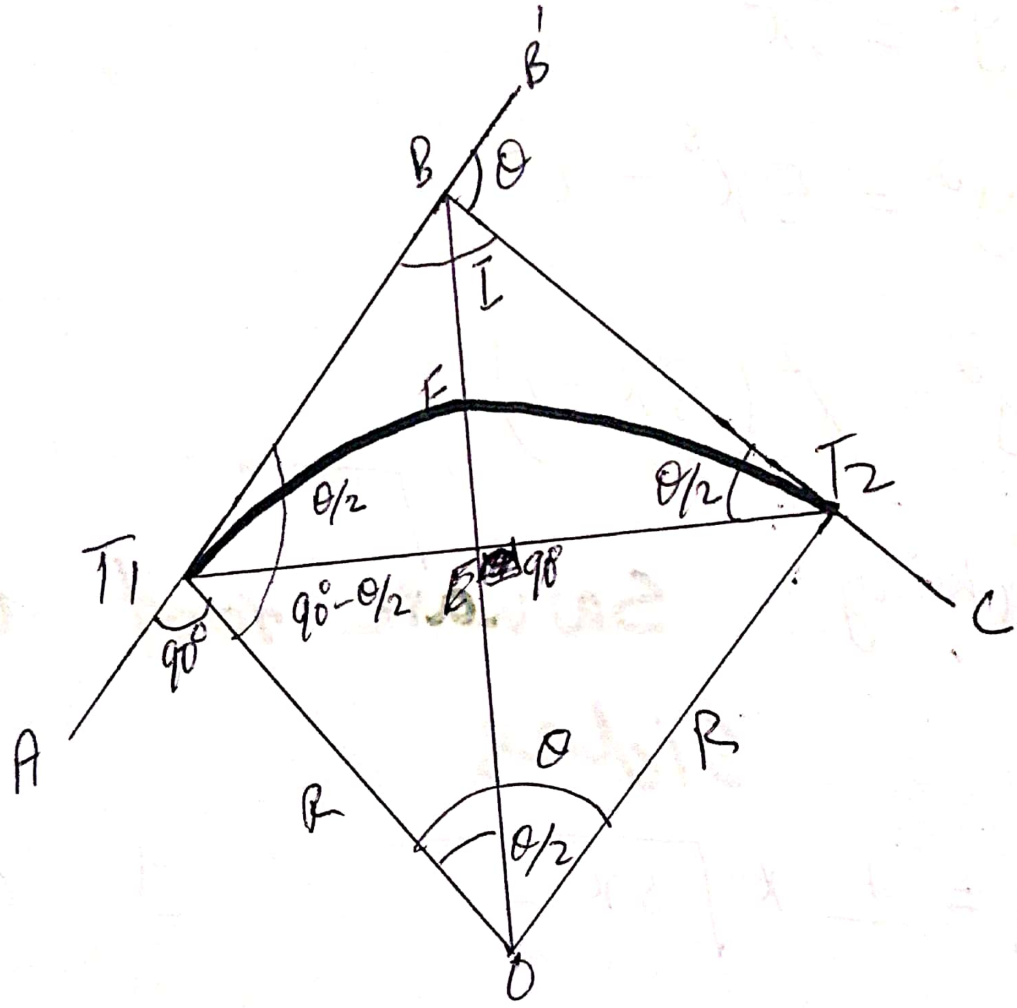
Section "A"

Semester 4th

Instructor : Engr Abdul Farhan

Program BE Civil

Q#1 part A



Q# 1) Two tangent is meet at a chainage of (ID) with the deflection angle of 14° 13' 23''

Degree of curve of is 5°

Calculate:

1) Chainage at the beginning and end of curve.
2) length of long chord
3) mid ordinats of external distance

Solution

ID # 7925

Degree of curve = 5°

$R = \frac{5729.58}{D°} = \frac{5729.58}{5°} = 1145.916\ ft$

$R = \boxed{1145.916\ ft.}$ 2

Now

So we first find the tangent length

$BT_1 = BT_2 = R\tan(\theta/2) = 1145.916 \times \tan\left(\frac{14^\circ 13' 23''}{2}\right)$

$\boxed{= 142.9655\ ft}$

Then length of curve (L)

$L = \left(\frac{\pi R \theta}{180}\right)$

$L = \frac{3.14 \times 1145.916 \times 14^\circ 13' 23''}{180}$

$L = 284.46\ ft$

Now we find chainage

Chainage of intersection point

$B = 7925\ ft$

So

$T_1 = 7925 - 142.9655 \rightarrow$ tangent length

$T_1 = 7782.0345$

Now

$T_2 = 7782.045 + 284.46 \rightarrow$ length of curve

$T_2 = 8066.4945$

Now length of chord

$l = 2R \sin(\theta/2)$

$l = 2 \times 1145.916 \sin\left(\frac{14°13'23''}{2}\right)$

$\boxed{l = 283.731 ft^2}$

Scanned with CamScanner

Now mid ordinats

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

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

$$EF = 8.8154\ ft^2$$

Now

External Distance

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

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

$$\boxed{BF = 8.8858\ ft}$$

Q#(1)

(8)

~~Q#1~~ (Part b)

ID # 7925 = 7.925

Chainage (m)	0	30	60	90	120	150
offset (m)	7.925	7.925+3 10.925	7.925+4 11.925	7.925−2 5.925	7.925−4 3.925	7.925−3 4.925

As we know that

$b = 30m$

So we can find the area than

$$Area = \frac{b}{3}\left(7.925+3.925+2(11.925)+4(10.925)+4(5.925)\right)+\left(\frac{3.925+4.925}{2}\right)\times b$$

$b = 30$

$$Area = \frac{30}{3}\left(7.925+3.925+2(11.925)+4(10.925)+4(5.925)\right)+\left(\frac{3.925+4.925}{2}\right)\times 30$$

$$A = 10\left(11.85+23.85+43.7+23.7\right)+\left(\frac{8.85}{2}\right)\times 30$$

(6)

Area $= 10(103.1) + (4.425) \times 30$

Area $= 1031 + 132.75$

Area $= 1163.75$

$\boxed{\text{Area} = 1163.75\, m^2}$

Q#2: A circular curve of radius (ID - 200) deflection Angle of ~~20° 40'~~ 20° 40' is to be set out b/w two straight heaving chainage of the point Intersection is (ID - 400) m

calculate all the ~~ness~~ neceessary for setting out the curve using deflection Angle method ~~wh~~ with peg interval being 20m

Given data

As we ~~resu~~ assume the radius it become

ID - 7000 = 7925 - 7000

R = 925m

deflection Angle = 20° 40'

Chainage at point of Intersection which we also assume

8

$ID - 5000 \Rightarrow 7925 - 5000$

$\boxed{\text{chainage} = 2925\, m}$

Peg interval $= 20m$

we can find tangent length

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

$= 925 \tan\left(\frac{20^\circ 40'}{2}\right)$

$BT_1 = BT_2 = 925\left(\frac{0.37781}{2}\right)$

$= 925\,(0.18860)$

$\boxed{BT_1 = BT_2 = 174.456\, m}$

Now

Length of curve

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

$L = \frac{3.14 \times 925 \times 20^\circ 40'}{180^\circ}$

$\boxed{L = 333.50\, m}$

9

Chainage of ~~Intersection~~ of point of Intersection = 2925m

$T_1 = 2925 - 174.456 \longrightarrow$ tangent length

$T_1 = 2750.544$ m

Chainage of $T_2 = 2750.544 + 333.50$ → length of curve

$\boxed{T_2 = 3084.044}$

Now we can find 1st chord $= C_1$

Assume value

$\boxed{2775}$

length of ist chord = ~~2775 - 2750.174~~

2775 - 2750.544

$\boxed{C_1 = 24.566 \text{ m}}$

Scanned with CamScanner

length of last sub chord $C_{15} = ?$

Assume value $\boxed{= 3064}$

$C_{15} = 3084.044 - 3064 = \boxed{20.044}$

$$\boxed{C_{15} = 20.044 m}$$

So we know that

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

$= C_{11} = C_{12} = C_{13} = C_{14} = 20m$

$b = 1$

Now we can find Nomber of chord

$$\text{No of chord} = \frac{\text{Length of curve} - C_1}{\text{Interval}}$$

$$= \frac{333.50 - 24.566}{20}$$

No of chord = 15.44

Now deflection Angle

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

$$\delta_1 = \frac{1718.9 \times 24.566}{60 \times 925} \Rightarrow \frac{42226.49}{55500}$$

$$\delta_1 = 0^\circ\ 45'\ 41.61''$$

$$\delta_2 = \frac{1718.9 \times 20}{60 \times 925} = \frac{34378}{55500} = 0^\circ\ 37'\ 9.92''$$

So

$$\delta_2 = \delta_3 = \delta_4 ---- \delta_{14} = 0^\circ 37' 9.92''$$

$$\delta_{15} = \frac{1718.9 \times 20.044}{60 \times 925}$$

$$\delta_{15} = \frac{34453.6316}{55500} = 0^\circ 37' 14.83''$$

Now total deflection (tangential) angle for the chord use-

$$\Delta_1 = \delta_1 = 0^\circ 45' 41.61''$$

$$\Delta_2 = \delta_1 + \delta_2 = \Delta_1 + \delta_2 = 0^\circ 45' 41.61'' + 0^\circ 37' 9.92''$$

$$\boxed{\Delta_2 = 1^\circ 22' 51.53''}$$

$$\Delta_3 = \Delta_2 + \delta_3 = 2^\circ 0' 1.45''$$

$$\Delta_4 = \Delta_3 + \delta_4 = 2^\circ 37' 11.37''$$

$$\Delta_5 = \Delta_4 + \delta_5 = 3^\circ 14' 21.29''$$

$$\Delta_6 = \Delta_5 + \delta_6 = 3^\circ 51' 31.21''$$

$$\Delta_7 = \Delta_6 + \delta_7 = 4^\circ 28' 41.13''$$

$D_8 = D_7 + \delta_8 = 5^\circ \; 5' \; 51.08''$

$D_9 = D_8 + \delta_9 = 5^\circ \; 43' \; 0.97''$

$D_{10} = D_9 + \delta_{10} = 6^\circ \; 20' \; 10.89''$

$D_{11} = D_{10} + \delta_{11} = 6^\circ \; 57' \; 20.81''$

$D_{12} = D_{11} + \delta_{12} = 7^\circ \; 34' \; 30.73''$

$D_{13} = D_{12} + \delta_{13} = 8^\circ \; 11' \; 40.65''$

$D_{14} = D_{13} + \delta_{14} = 8^\circ \; 48' \; 50.57''$

$D_{15} = D_{14} + \delta_{15} = 8^\circ 48' 50.57'' + 0^\circ 37' 14.83''$

$D_{15} = 9^\circ \; 26' \; 54''$

$D_{16} = \cancel{D_{13}} D_{15} + \delta_{16} = 10^\circ \; 4' \; 3.92''$

Check $= \frac{\theta}{2} = \frac{20^\circ 40'}{2}$

$10^\circ \; 20' \; 0''$

Q # 3)

Given data

$\Delta AKM = 130^\circ$

$\Delta KMC = 140^\circ$

1st Arc radius = (7925 − 300) 7625m

2nd Arc radius = (7925 − 200) 7725m

Chainage of Intersection point

(7925 − 400) = 7525m

Required

Tangent point = ?

compound curvature = ?

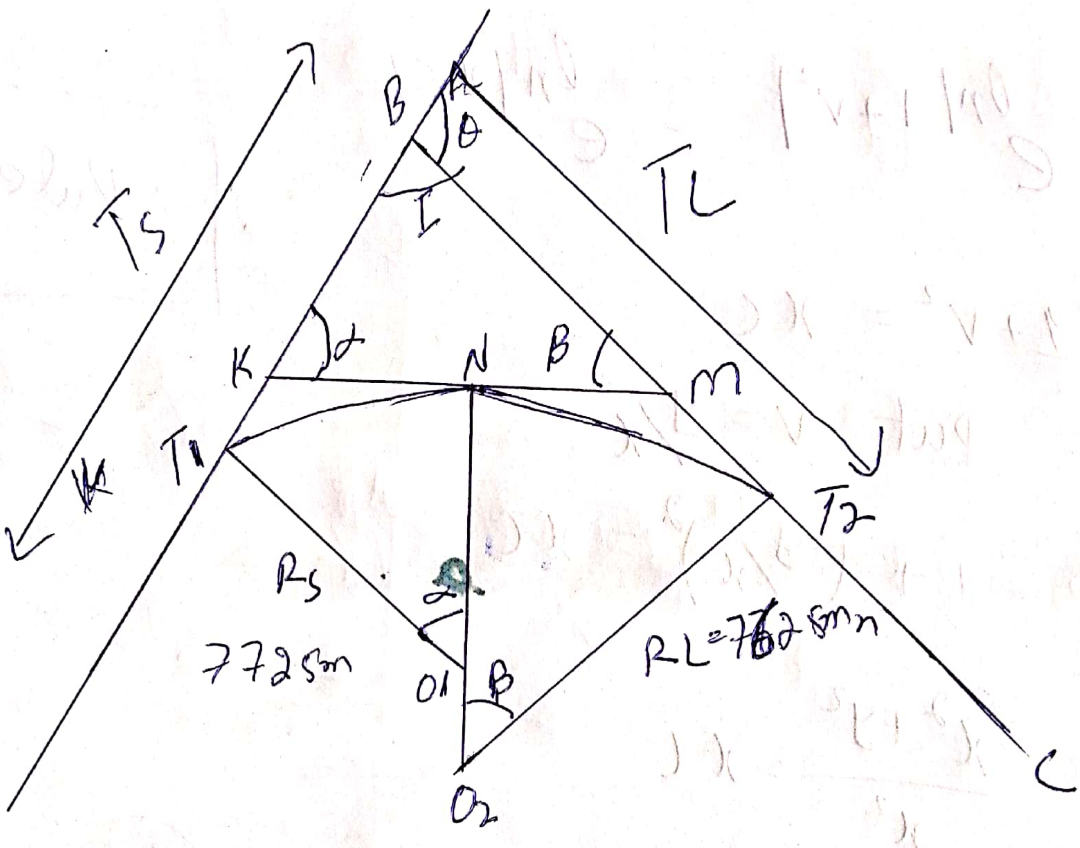
Sol:

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

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

$\phi = \alpha + \beta = 40^\circ + 50^\circ = 90^\circ$

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


A
B
θ
I
Ts
TL
K
α
N
β
M
T1
T2
Rs
7725m
O1
β
RL=7725mn
O2
C

$KT_1 = KN = R_5 \tan\left(\frac{\alpha}{2}\right)$

$= 7625 \tan\left(\frac{50^\circ}{2}\right)$

$\boxed{KT_1 = KN = 3555.59\ m}$

$MN = MT_2 = R_2 \tan\left(\frac{\beta}{2}\right) = 7725 \tan\left(\frac{40^\circ}{2}\right)$

$\boxed{MN = MT_2 = 2811.67\ m}$

~~How~~ $KM = MT_2 + KT_1 = 3555.59 + 2811.67$

$\boxed{KM = 6367.26m}$

No further solution

Find $\triangle BKM$ by sin rule

$$\frac{BK}{MK \sin B} = \frac{1}{\sin(I)}$$

by cross multiplication

$MK \sin B = BK \sin I$

$BK \sin I = MK \sin B$

Divided $(\sin I)$ ~~by~~ both sides

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

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

$$BK = \frac{6367.26 \times \sin 40}{\sin 90^\circ}$$

$$\boxed{BK = 4092.79m}$$

$$Bm = \frac{MK \sin \alpha}{\sin I} = \frac{6367.26 \times \sin(50)}{\sin(90^\circ)}$$

$$\boxed{BM = 4877.60m}$$

$$T_L = KT_1 + BK = 3555.59 + 4092.79 =$$

$$\boxed{T_L = 7648.38m} \quad \boxed{T_L = 7648.38m}$$

$$T_S = MT_2 + Bm = 2811.67 + 4877.60$$

$$\boxed{TS = 7689.27} \Rightarrow \boxed{TS = 7689.27m}$$

Scanned with CamScanner

(17)

$$L_L = \frac{\pi R_S \alpha}{180} = \frac{\pi\ 7625 \times 50}{180}$$

$$L_L = \frac{1197732.199}{180} = 6654.06\,m$$

$$\boxed{L_L = 6654.06m}$$

$$L_S = \frac{\pi R_2 \beta}{180} = \frac{3.14 \times 7725 \times 40}{180}$$

$$\boxed{L_S = 5393.067m}$$

No we find chainage

chainage of Intersection point $-T_L$

$$= (7525 - 7648.38)$$

$$\boxed{\text{Chainage of } T_1 = -123.38}$$

(18)

plus L_s = 6654.04m

= 6654.04 − 123.38

$\boxed{l = 6530.66m}$

Chainage of compund ~~curr~~ curvature (N) plus L_s = 5393.06m

chainage of T_2 = 5393.06 + 6530.66

$\boxed{\text{Chainage of } T_2 = 11923.72m}$