MID TERM EXAM

NAME	SABQ-UL-HASSAN
ID	7932
SECTION	B
DEPT	BE(C)
SUBJECT	ADVANCE ENGINEERING SURVEYING
SEMESTER	4th
SUBMITTED TO	ENGR. ABDUL FARHAN
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QUESTION # 01

(a)

Two tangents meets at a chainage ...—

—.. 3. mid ordinate & External degree?

Sol

GIVEN THAT :-

degree of curve = D = 5°

$\theta = 14^\circ 13' 25'$

Chainage intersection = 7932 ft

i) RADIUS :-

$$R = \frac{5729.28}{5^\circ}$$

$$R = 1145.85 \text{ ft}$$

ii) LENGTH OF CORD :~

$$= 2R \sin \frac{\theta}{2}$$

$$= 2(1145.85) \sin \frac{14^\circ 13' 25'}{2}$$

length of long cord = 283.72 ft

iii) MID ORDINATE

$$= R(1 - \cos \theta/2)$$

$$= 1145.85\left(1 - \cos\left(\frac{14^\circ 13' 25''}{2}\right)\right)$$

mid ordinate = 8.81 ft

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

$$= 1145.85\left(\frac{1}{\left(\cos\frac{14°13'25''}{2}\right)} - 1\right)$$

$$= 8.88 ft$$

TANGENT LENGTH :-

$$= R \tan \theta/2$$

$$= 1145.85 \tan\left(\frac{14°13'25''}{2}\right)$$

$$= 143.13 ft$$

LENGTH OF CURVE :-

$$L_1 = \frac{\pi R \theta}{180°}$$

$$= \frac{3.14(1145.85)(14°13'25'')}{180°}$$

$$L_1 = 284.31 ft$$

Intersection chainage	=	7932 ft
Minus tangent length	=	- 143.13 ft
T_1	=	7788.87
Add length of curve	=	+ 284.31 ft
T_2	=	8073.18 ft

QUESTION NO 01

(b)

Chainage	0	30	60	90	120	160
Offsets	7.932	10.932	11.932	5.932	3.932	4.932

offsets = 6
intersepts = 5
interval = 30

Sol

Offsets No	Offsets	Simpson's Multiplier	Product
1	7.932	1	7.932
2	10.932	4	43.72
3	11.932	2	23.86
4	5.932	4	23.728
5	3.932	1	3.932

$\Sigma = 103.172$

$$\text{Area } (h_1 - h_5) = \frac{30}{3}(103.172) = 1031.72$$

$$\text{Area } (h_5 - h_6) = \frac{30}{2}(3.932 + 4.932)$$

$$= 132.96$$

Total area = 1031.71 + 132.96

$$\boxed{\text{Total Area} = 1178.64 m^2}$$

QUESTION # 02

A circular Curve of Radius (I.D ÷ 11) .....
.... Peg Interval being 20 m.

GIVEN THAT:-

$\theta = 20°40'$

$R = (ID \div 11) = 7932 \div 11$

$= 721.090\ m$

Intersection Chainage $= (ID - 400) = 7532\ m$

Peg Interval $= 20\ m$

Sol

Tangent length $= R \tan \theta/_2$

$= 721.090 \tan \dfrac{20°40°}{2}$

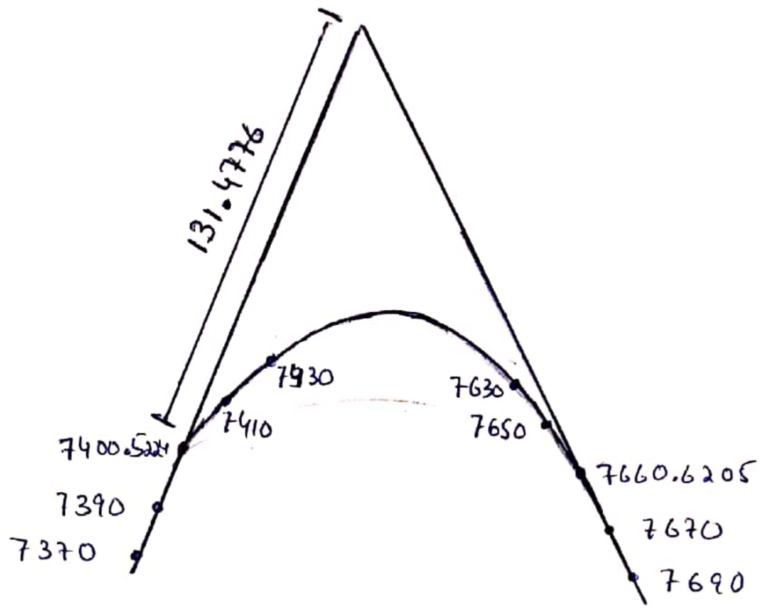
$$\boxed{T.L = 131.4776\ m}$$

Length of curve $= \dfrac{R \pi \theta}{180°}$

$= \dfrac{721.090 (\pi)\ 20°40°}{180°}$

$$\boxed{\text{CURVE LENGTH} = 260.0981\ m}$$

Intersection Chainage	=	+ 7532 m
(−) tangent length	=	− 131.4776
T_1	=	7400.5224
(+) Curve length	=	+ 260.0981
	=	7660.6205



FOR INITIAL CHORD :~

7370 7390 7400.5224 7410 7430

$$I.C = 7410 - 7400.5224$$

$$\boxed{I.C = 9.4776}$$

FOR FINAL CORD :~

7630 7650 7660.6205 7670 7690

$$F.C = 7660.6205 - 7650$$

$$\boxed{F.C = 10.6205}$$

FOR NO OF CORD :~

$$\text{No. of Cords} = \frac{7650 - 7410}{20}$$

$$\boxed{\text{No. of Chords} = 12}$$

So

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

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

BY DEFLECTION ANGLE :-

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

$$\delta_1 = \frac{1718.9 \times 9.4776}{60 \times 721.090}$$

$$\boxed{\delta_1 = 0^\circ 22' 35.54''}$$

$$\delta_{14} = \frac{1718.9 \times C_{13}}{60 \times 721.090}$$

$$= \frac{1718.9 \times 10.6205}{60 \times 721.090}$$

$$\boxed{\delta_{14} = 0^\circ 25' 19''}$$

$$\delta_2 = \frac{1718.9 \times C_a}{60 \times R}$$

$$= \frac{1718.9 \times 20}{60 \times 721.090}$$

$$\boxed{\delta_2 = 0^\circ 47' 40.5''}$$

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

$\delta_{11} = \delta_{12} = \delta_{13}$

Now Total Deflection Angle for the Chords

$\Delta_1 = \delta_1 = 0°22'35.54''$

$\Delta_2 = \delta_1 + \delta_2 = 0°22'35.54'' + 0°47'40.5'' = 1°10'16.04''$

$\Delta_3 = \Delta_2 + \delta_3 = 1°10'16.04'' + 0°47'40.5'' = 1°57'56.54''$

$\Delta_4 = 2°45''37.04''$

$\Delta_5 = 3°33'17.57''$

$\Delta_6 = 4°20'58.04''$

$\Delta_7 = 5°8'38.54''$

$\Delta_8 = 5°56'19.04''$

$\Delta_9 = 6°43'59.54''$

$\Delta_{10} = 7°31'40.04''$

$\Delta_{11} = 8°19'20.54''$

$\Delta_{12} = 9'7'1.04''$

$\Delta_{13} = 9°54'41.54$

$\Delta_{14} = \Delta_{13} + \delta_{14}$
$= 9°54'41.54 + 0°25'19''$

$$\boxed{\Delta_{14} = 10°20'0.54''}$$

Check :~

$$\Delta_{14} = \frac{\theta}{2} = \frac{20°40'}{2} \quad \boxed{\Delta_{14} = 10°20'0''}$$

QUESTION # 03

Two tangents AB & BC ....

.... intersection point is (ID - 400) m.

GIVEN THAT :~

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

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

$R_1 = 7932 - 300 = 7632$

$R_2 = 7932 - 200 = 7732$

Chainage of Intersection $= ID - 400$
$= 7932 - 400$
$= 7532$

Sol

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

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

$\boxed{I = 90^\circ}$

Now $KT_1 = KN = R_1 \tan(\alpha/2)$

$= 7632 \tan(50^\circ/2)$

$\boxed{KT_1 = KN = 3558.860 \text{ m}}$

$MN = MT_2 = R_2 \tan(\beta/2)$

$= 7732 \tan\left(\frac{40^\circ}{2}\right)$

$\boxed{MN = MT_2 = 2814.217 \text{ m}}$

$KM = MT_2 + KT_1 = 3558.86 + 2814.217$

$$\boxed{KM = 6373.077851 \ m}$$

Now

finding ΔBKM by Sine Rule.

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

$$= \frac{6373.07785 \sin 40^\circ}{\sin 90}$$

Then,

$$\boxed{BK = 4096.5354 \ m}$$

$$BM = \frac{MK \sin\alpha}{\sin I}$$

$$= \frac{6373.07785 \sin 50^\circ}{\sin 90}$$

Now

$$\boxed{BM = 4882.060873 m}$$

$$T_S = KT_1 + BK$$

$$= 3558.86 + 4096.5354$$

$$\boxed{T_S = 7655.3954}$$

$$T_L = MT_2 + BM$$

$$= 2814.217 m + 4882.060873$$

$$\boxed{T_L = 7696.27787}$$

$$L_L = \frac{\pi R_L \alpha}{180^\circ}$$

$$= \frac{3.14 \alpha 7632 \times 50^\circ}{180^\circ} \Rightarrow \boxed{L_L = 6656.8 m}$$

$$L_s = \frac{\pi R_2 \beta}{180}$$

$$= \frac{3.14 \times 7732 \times 40^\circ}{180^\circ}$$

$$\boxed{L_s = 5395.217778 m}$$

Chainage of Intersection $= 7532$

$(-)\ T_L = 7655.3954$

$= -123.3954$

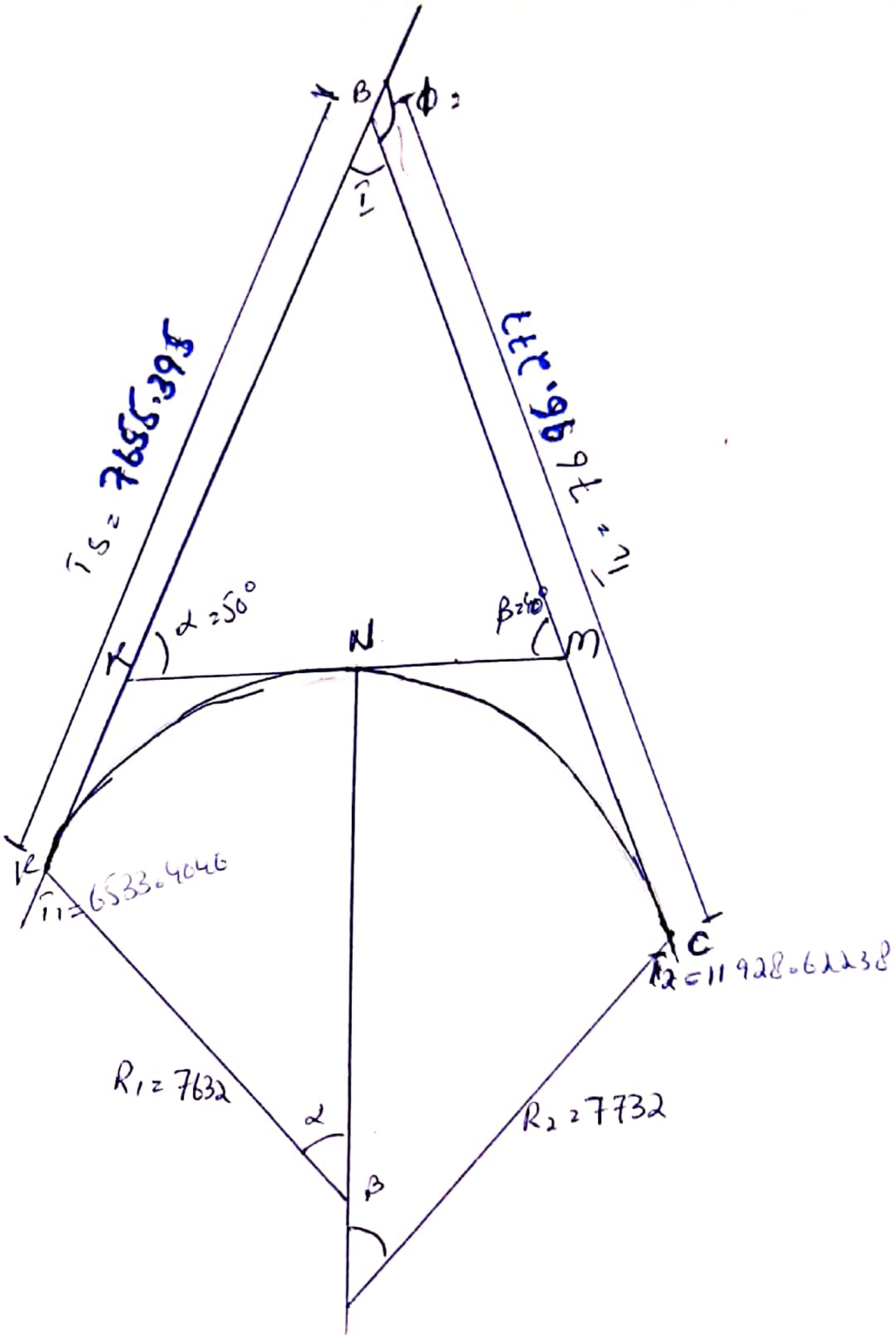
plus $L_L = -118.3 + 6656.8 m$

$$\boxed{T_1 = 6533.4046 m}$$

Chainage of Compound Curvature

plus $L_s = 6533.4046 + 5395.217778$

$$\boxed{T_2 = 11928.62238}$$



B
I
Ts = 7655.398
T2 = 7696.773
α = 50°
β = 40°
K
N
M
R
T1 = 6533.4046
C
T2 = 11928.62238
R1 = 7632
R2 = 7732
α
β