(b) A point M lies mid-way of line RS of a traverse. Using the datum co-ordinates provided in **table 2**, determine the:

(i) bearing MN;
(ii) distance MN;
(iii) co-ordinates of M.

(11 marks)

Table 2

Point	Northings(m)	Eastings(m)
R	−7317.37	−9136.65
S	−7317.55	−8736.73
N	−7517.48	−8936.57

7. (a) With the aid of a sketch, state **six** elements of a simple circular curve. (6 marks)

(b) Two straights intersect with a deflection angle of 36°45'. Using the data provided. Calculate the:

(i) tangent length;

(ii) chainage of intersection point;

(iii) chainage of first tangent point;

(iv) number of the standard chords;

(v) lengths of the two sub-chords.

(14 marks)

Data

Radius of curve	385 m
Standard chord length	20 m
Chainage of last tangent point	3586.98 m

8. (a) With the aid of sketches, state **two** obstacles encountered in curve ranging.

(6 marks)

(b) With the aid of a labelled sketch, outline the field procedure of setting a circular curve using a theodolite and tape.

(14 marks)

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SECTION B: SURVEYING II

Answer at least TWO questions from this section.

5. **Figure 1** shows distances and bearings of a traverse run between two points Y and Z. Using the data in **table 1**. Determine the:

(a) adjusted co-ordinates of the new points by Bowditch's method; ($16\frac{1}{2}$ marks)

(b) accuracy of the traverse. ($3\frac{1}{2}$ marks)

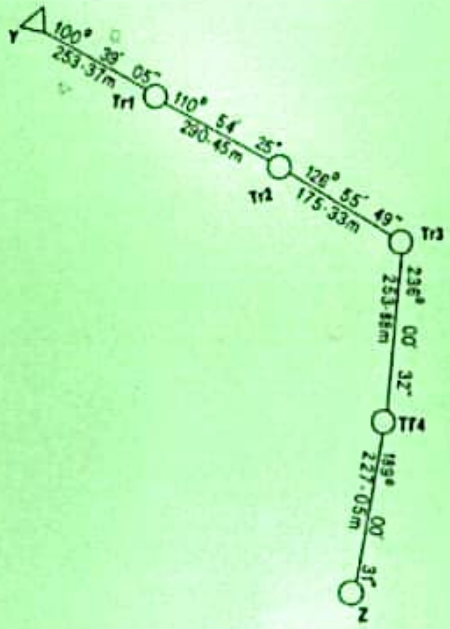

FIGURE 1

Table 1

Point	N (metres)	E (metres)
Y	+8536.67	+9165.83
Z	+7914.75	+9580.20

6. (a) Outline the procedure for each of the following temporary adjustments for a theodolite:-

(i) centering;
(ii) levelling;
(iii) focusing.

(9 marks)

(b) A point M lies mid-way of line RS of a traverse. Using the datum co-ordinates provided in **table 2**, determine the:

(i) bearing MN;
(ii) distance MN;
(iii) co-ordinates of M.

(11 marks)

8. **Figure 3** shows a circular curve to be set out using 25 m standard chords on a through chainage basis between two straights deflecting at an angle of 32°.

Determine the:-

(a) radius of the curve; (3 marks)

(b) Chainages of:

(i) first tangent point;
(ii) intersection point.

(8 marks)

(c) sub-chord lengths; (4 marks)

(d) deflection angles for:

(i) first sub-chord;
(ii) standard chord;
(iii) last sub-chord.

(5 marks)

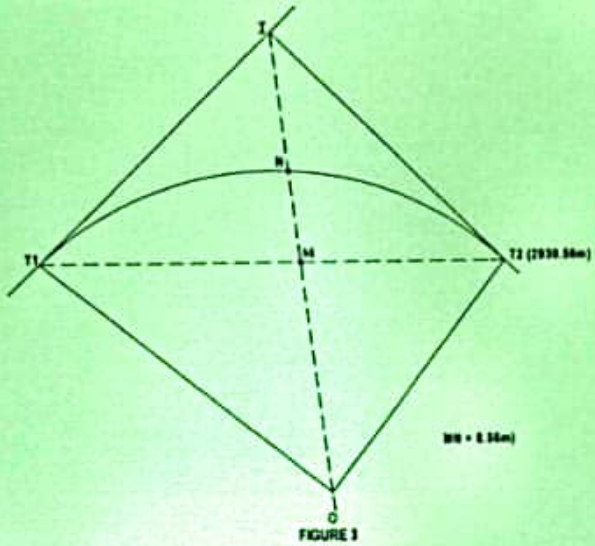

FIGURE 3

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SECTION B: SURVEYING II

*Answer at least **TWO** questions from this section.*

5. **Figure 1** shows a traverse run between two control points T and W. Using the bearings in the figure and datum bearings in **table 1**. Prepare a traverse bearing sheet. (20 marks)

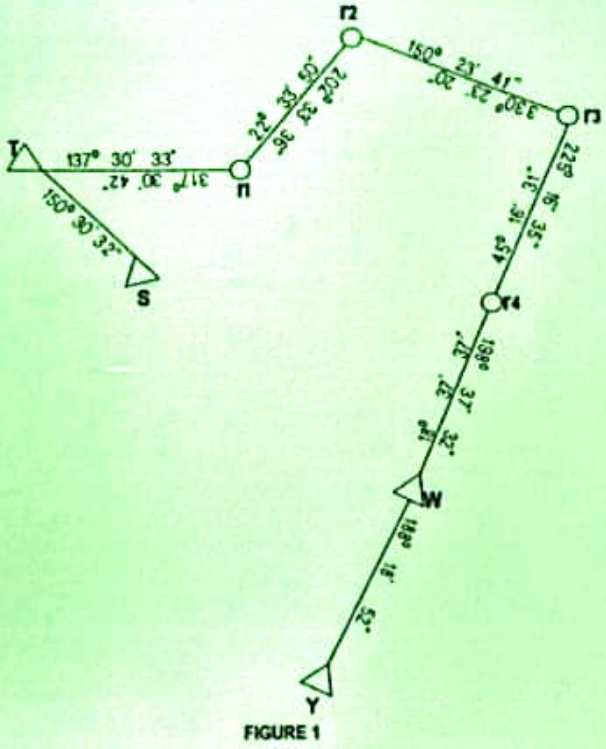

FIGURE 1

Table 1: Datum bearings

Line	Bearing
S - T	330° 30' 26"
Y - W	08° 18' 44"

6. **Figure 2** shows two straights AI an BI connected by a simple circular curve on a through chainage basis and the intersection point is inaccessible. Using the data provided, determine the:

(a) chainages of the tangent points; (12 marks)

(b) deflection angels for the:

(i) first sub-chord;
(ii) standard chord;
(iii) last sub-chord.

(8 marks)

6. **Figure 2** shows two straights AI an BI connected by a simple circular curve on a through chainage basis and the intersection point is inaccessible. Using the data provided, determine the:

(a) chainages of the tangent points; (12 marks)

(b) deflection angels for the:

(i) first sub-chord;
(ii) standard chord;
(iii) last sub-chord.

(8 marks)

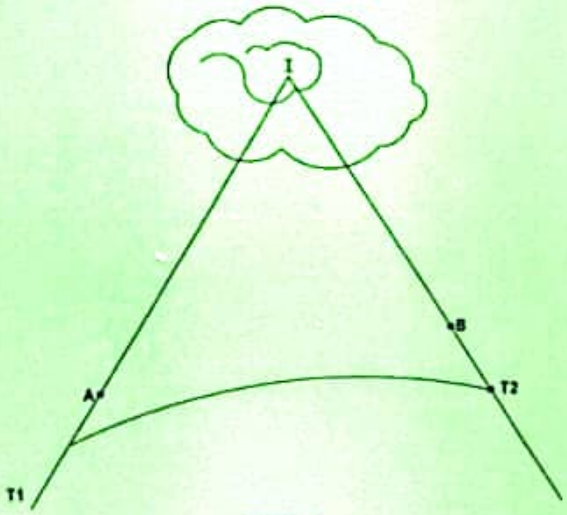

FIGURE 2

Data:

AB	=	630.35 m
IÂB	=	69°45'030"
AB̂I	=	63°10'20"
Chainage A	=	4056.98 m
Standard chord	=	30 m
Curve radius	=	550 m

7. (a) Define each of the following terms for a theodolite:

(i) face left observations;
(ii) changing face;
(iii) centering;
(iv) swinging the telescope.

(6 marks)

(b) **Table 2** shows differences in Northings and Eastings of a traverse. If the datum co-ordinates are as shown in **table 3**. Compute the:

(i) adjusted co-ordinates of new points K_1, K_2, K_3 and K_4;

(ii) relative traverse accuracy.

7. (a) Define each of the following terms for a theodolite:

(i) face left observations;
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(iii) centering;
(iv) swinging the telescope.

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(b) **Table 2** shows differences in Northings and Eastings of a traverse. If the datum co-ordinates are as shown in **table 3**. Compute the:

(i) adjusted co-ordinates of new points K_1, K_2, K_3 and K_4;

(ii) relative traverse accuracy.

(14 marks)

Table 2

LEG	ΔN	ΔE	DISTANCE (m)
P - K_1	− 88.196	+ 85.907	123.12
K_1 - K_2	− 100.305	+ 123.087	200.05
K_2 - K_3	− 9.428	+ 100.931	101.37
K_3 - K_4	+ 32.047	+ 32.059	45.33
K_4 - R	+ 308.659	+ 12.691	308.92

Table 3: DATUM CO-ORDINATES

POINT	NORTHINGS	EASTINGS
P	+10350.80	+ 6190.95
R	+10493.35	+ 6595.54

8. **Figure 3** shows a circular curve to be set out using 25 m standard chords on a through chainage basis between two straights deflecting at an angle of 32°.

Determine the:-

(a) radius of the curve; (3 marks)

(b) Chainages of:

(i) first tangent point;
(ii) intersection point.

(8 marks)