NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF ENGINEERING

DEPARTMENT OF CIVIL AND WATER ENGINEERING

ENGINEERING SURVEY II

TCW 2204

Special Supplementary Examination Paper

AUGUST 2024

This examination paper consists of pages 9

Time Allowed: 3 hours

Total Marks: 100

Special Requirements: None

Examiner's Name: P. Kamwemba

INSTRUCTIONS

1. Answer any four (4) questions
2. Each question carries 25 marks
3. Use of calculators is permissible

MARK ALLOCATION

QUESTION	MARKS
1.	**25**
2.	**25**
3.	**25**
4.	**25**
5.	**25**
TOTAL	**100**

Question 1

A traverse was run in the form of a polygon as shown in fig . question 1 . Given the following information :

Observed horizontal angles	Horizontal distances (m)
ABC = 235^0 02' 50''	AB = 152,530
BCD = 305^0 41' 30''	BC = 152.530
CDA = 233^0 52' 30''	CD = 152,530
DAB = 305^0 21' 50''	DA = 150, 930

Coordinates (m)

A + 1 000,000 + 1 000,000

A - B = 245^0 31' 20''

Calculate the adjusted coordinates of survey points B , C , D and A , adjusted by the Bowditch method . Use a table . **(25 marks)**

Question 2

Fig. question 2 shows a straight portion of Mopani road BA which is to be changed in direction by means of a curve AX .

Given the following information

Coordinates (m)

A + 430,770	- 366,100
B + 403, 890	- 50,010
X + 400,350	- 634,340

Calculate the radius of the curve . **(25 marks)**

Question 3

Fig. question 3 shows a triangulation network in the form of a braced quadrilateral .

Given the following information

Coordinates (m)

T + 1 885,820	+ 1 632,470
U + 1 401,000	+ 1 045,760

Adjusted horizontal angles

1	33^0 45' 04''
2	63^0 46' 26''
3	44^0 49' 02''
4	34^0 09' 54''
5	37^0 14' 37''
6	44^0 03' 00''
7	64^0 32' 29''
8	37^0 39' 28''

Calculate the coordinates of survey stations R and S . **(25 marks)**

Question 4

Curve centres P and Q are to be joined by a straight line $T_1 - T_2$ as shown in fig. question 4.

Given the following information

Coordinates (m)		Radius of curve (m)
P + 347 , 910	+ 279, 370	P = 600
Q + 441,330	- 352, 010	Q = 400

Calculate the coordinates of survey points T_1 , T_2 , distance $T_1 - T_2$ and the bearing $T_1 - T_2$.

(25 marks)

Question 5

Describe the Gauss conform or Lo system of coordinates . **(25 marks)**

Question 6

A survey point D was surveyed by sighting known pegs A , B and D as shown in fig. question 6.

The following mean observed horizontal angles were obtained :

ADC = 140^0 11' 48''

ADB = 83^0 35 ' 48''

BDC = 136^0 12' 30''

Given coordinates (m) of known pegs as :

A +2 891, 401	+2 142,001
B +1 364, 998	+3 214, 821
C +3 484, 321	+ 3 524,322

Calculate the coordinates of survey point D. **(25 marks)**

List of formulae

Sum of angles = (2n + 4) x 90^0

бy or бx = ± Δy or Δx x length of traverse leg concerned / total length of traverse

Fig. question 1

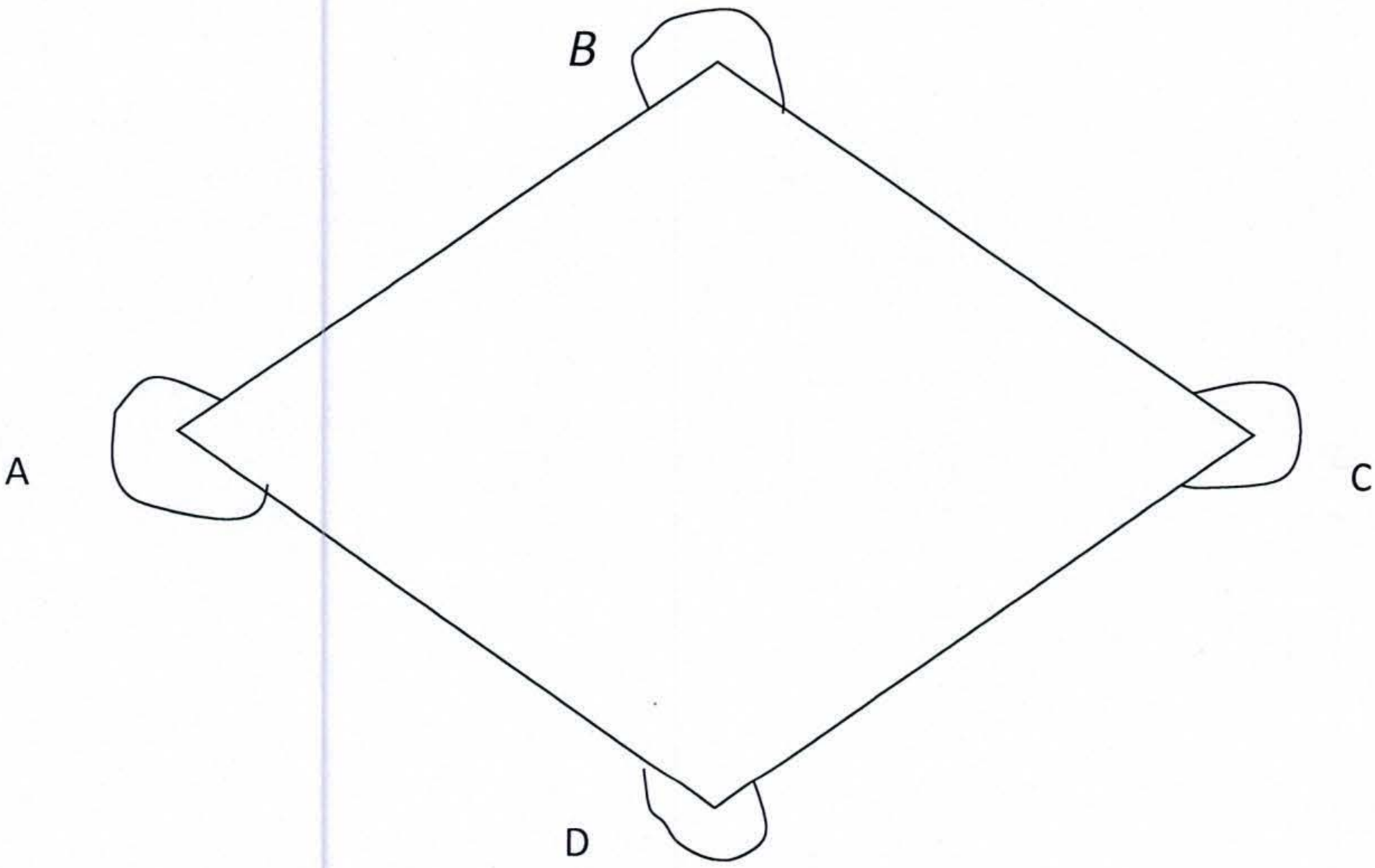

Fig . question 2

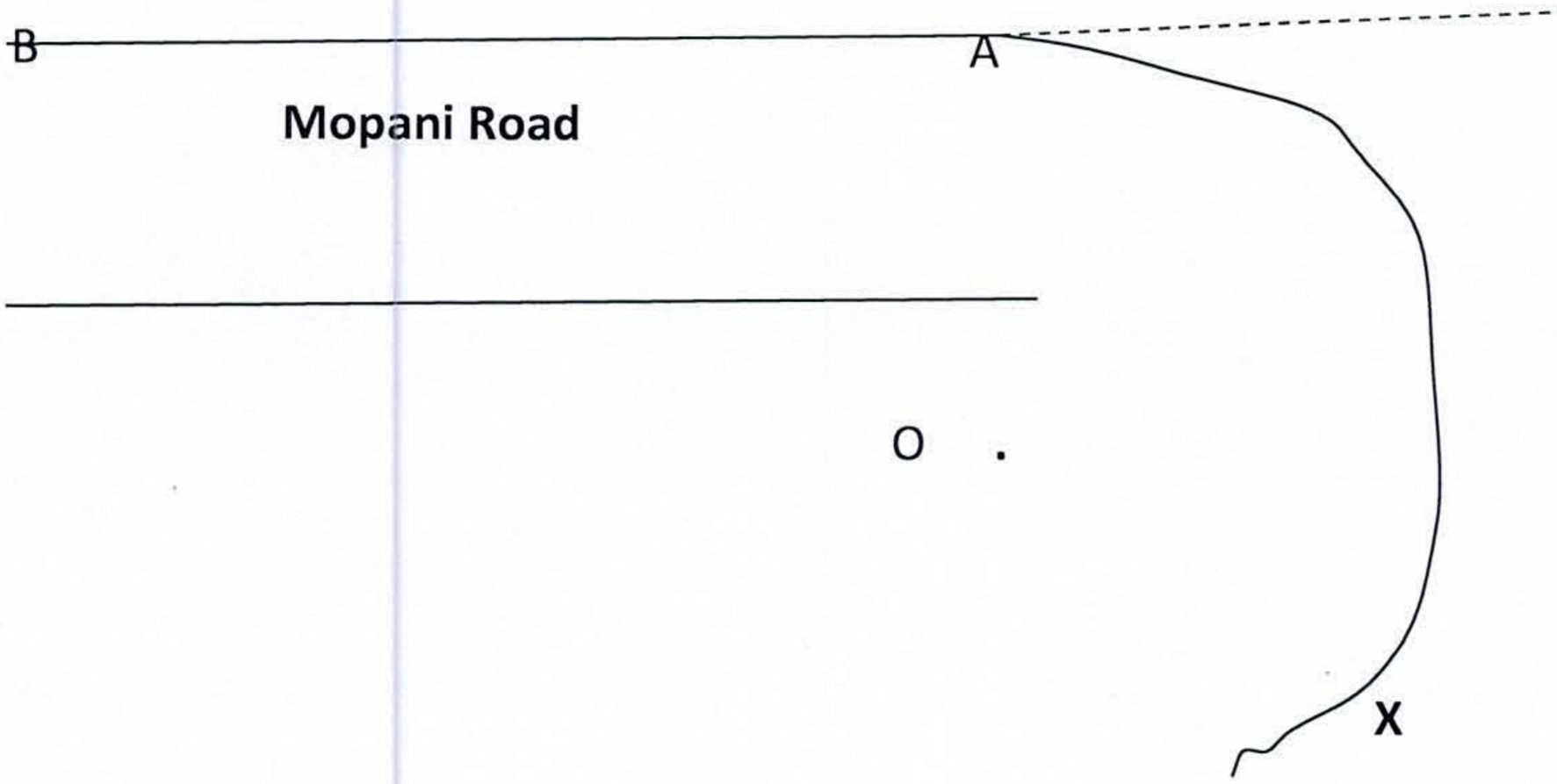

Fig. question 3

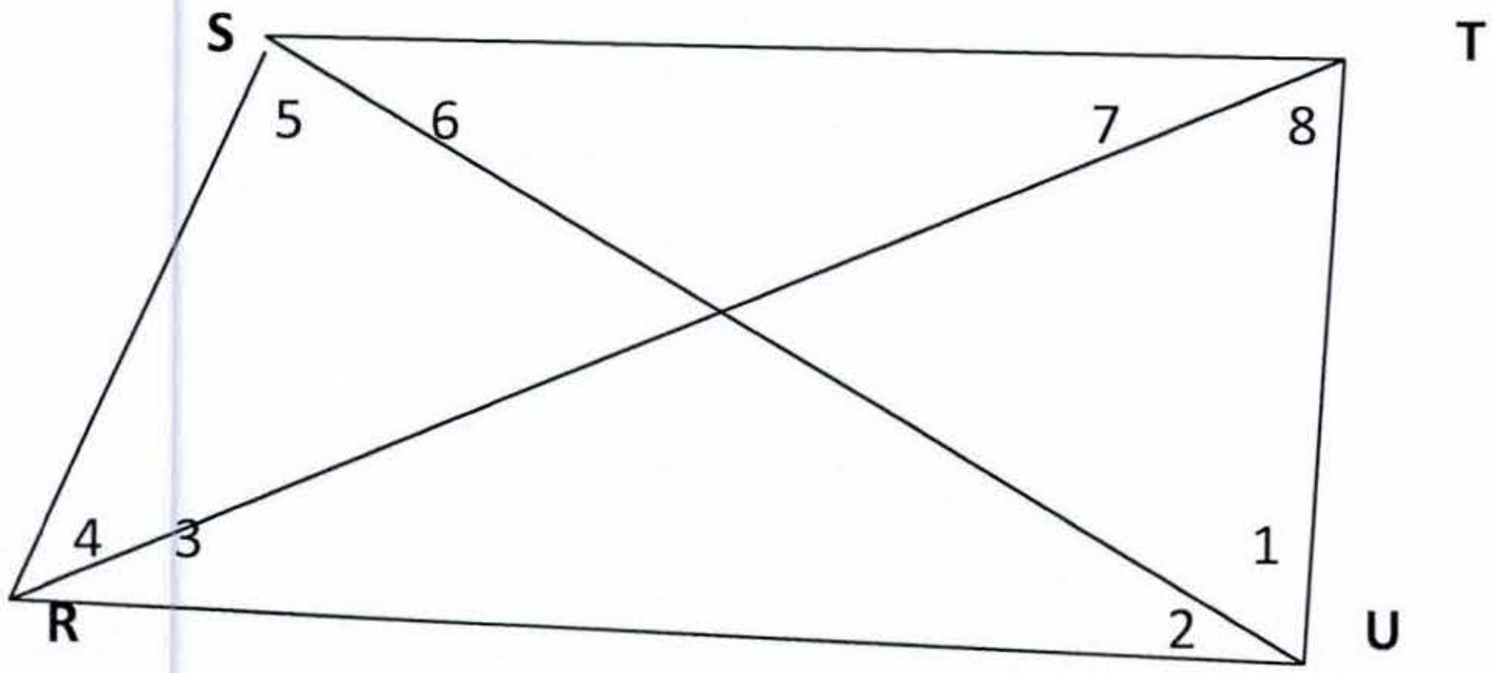

Fig. question 4

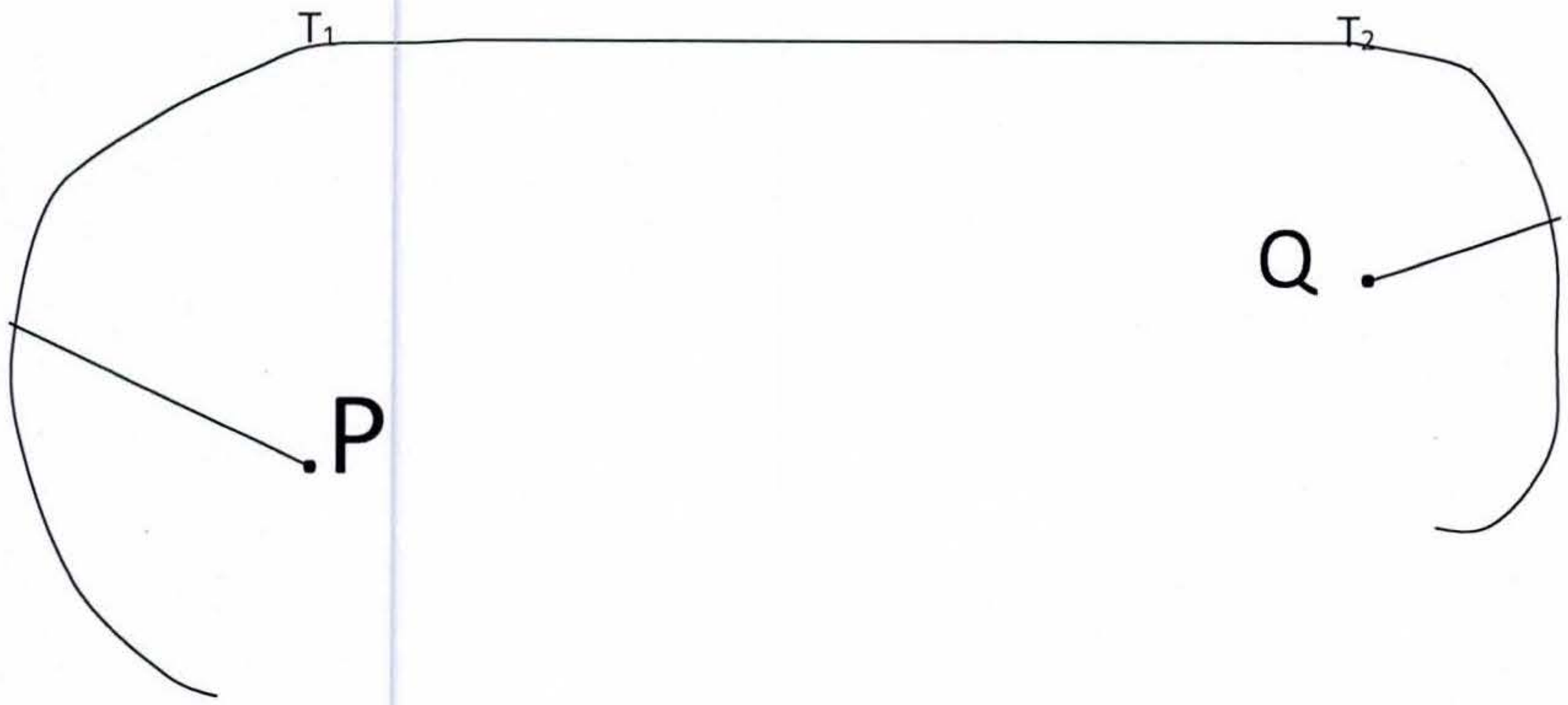

Fig. question 6