



TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF ENGINEERING AND TECHNOLOGY

Department of BUILDING & Civil engineering

UNIVERSITY EXAMINATION FOR:

BACHELOR OF TECHNOLOGY IN ENGINEERING SURVEY

TCV 4225 : ENGINEERING SURVEY - II

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: NOVEMBER 2024

TIME: 2 HOURS

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of five questions.

Attempt question ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

QUESTION ONE (COMPULSORY) - 20 Marks

a). a). The adjusted angles of a triangle ABC were given as shown below:

$$\Phi A = 74^{\circ} 04' 28''$$

$$\Phi B = 44^{\circ} 35' 49''$$

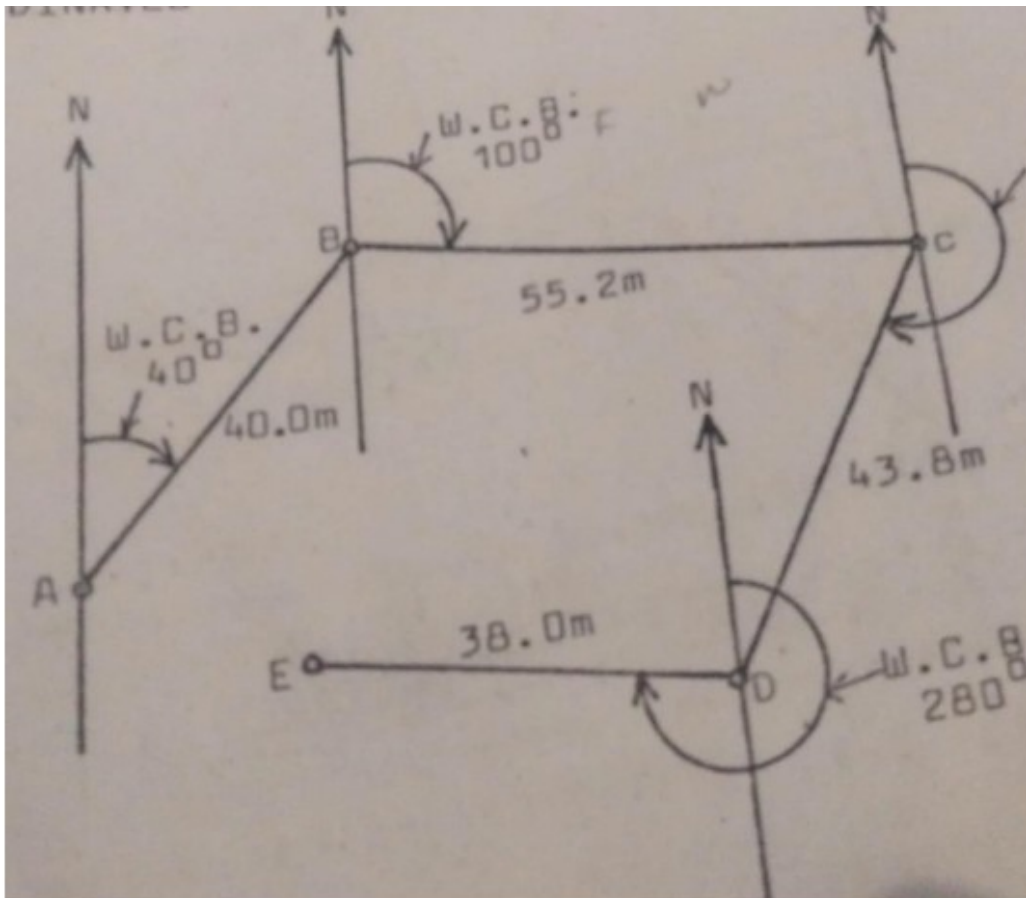
$$\Phi C = 61^{\circ} 19' 43''$$

Given the datum coordinates of points A and B respectively below, determine the provisional coordinates of point C.



Station	N (m)	E (m)	
A	+ 643 649.19	+ 409 577.46	
B	+ 641 668.40	+ 412 600.36	(10 Marks)

- b). What are the effects of misalignment of a theodolite (6 Marks).
- c). A traverse was run from point A to E (Fig 2). The W.C.Bs and the distances of lines AB, BC, CD and DE were provided as 400 and 40 m, 1000 and 55.20m, 2100 and 43.8 m, and 2800 and 38.0 m. Calculate the partial coordinates for each station (4 Marks)



ANSWER ANY TWO QUESTIONS FROM THIS SECTION



QUESTION TWO (20 Marks)

- a). Given the following coordinates of M and N, derive coordinates of B, C and D

Station	N (m)	E (m)
M	753.761	231.123
N	959.22	209.544

The other details were: M - B ($110.422, 356^{\circ} 19' 06''$), B - C ($120.42, 190^{\circ} 53' 00''$), C - D ($145.56, 25^{\circ} 31' 30''$) and D - N ($98.45, 356^{\circ} 19' 06''$)

(12 Marks).

- b). Discuss factors essential in traversing

(8 Marks).

QUESTION THREE (20 Marks)

The field abstract of Fig 2 shows the observed angles for a braced quadrilateral PQRS. Determine the adjusted values of all the angles in the quadrilateral using method of equal shifts

(20 Marks).

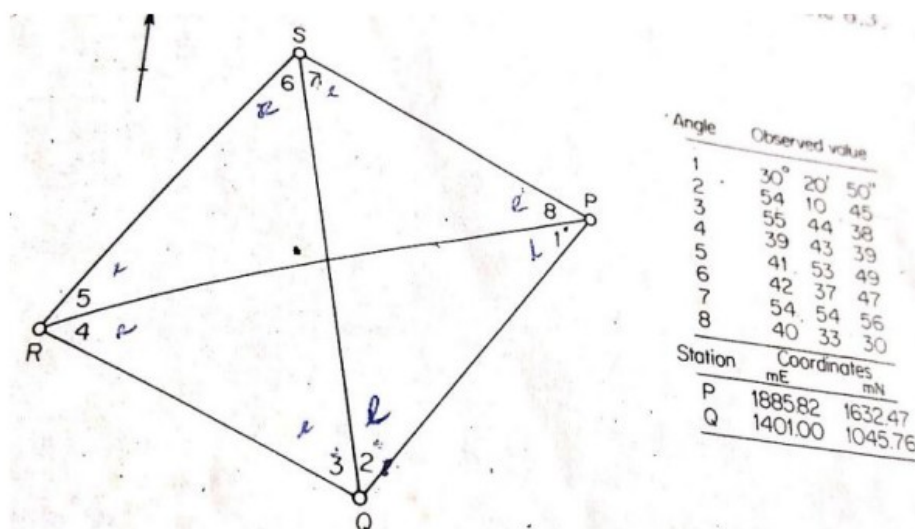


Fig 2: Quadrilateral

QUESTION FOUR (20 Marks)

A traverse was run from Donga to Twiga (See Table 1). The details were recorded as provided. Compute or adjust the new bearings for the traverse **(20 Marks)**.

Station	N (m)	E (m)
Twiga	+28 162.860	+68 5828.560
Donga	+26 594. 360	+ 68 6431.520
Nyoka	+ 23 857.590	+ 68 2214.040

Station	Observed bearing	Orientation corr	Oriented bearing	Adjust.	Final bearing
At Donga	Field notebook Pg1				
Nyoka	237° 01' 02"				
K ₆	251° 43' 54"				
Twiga	338° 58' 10"				
At K₆					
Donga	71° 43' 36"				
K ₇	354° 02' 54"				
At K₇	Field notebook Pg2				
K ₆	174° 02' 52"				
K ₈	43° 07' 35"				
At K₈	Field notebook Pg3				
K ₇	223° 07' 40"				
K ₉	05° 20' 22"				
At K₉					
K ₈	185° 20' 21"				
K ₁₀	326° 19' 24"				
At K₁₀					
K ₉	146° 19' 30"				
K ₁₁	338° 06' 22"				
At K₁₁					
K ₁₀	158° 06' 40"				
Twiga	298° 32' 24"				
At Twiga					
K ₁₁	118° 32' 24"				
Donga	158° 58' 09"				
JKU	220° 00' 45"				220° 00' 53"

QUESTION FIVE (20 Marks)

a). Explain the following terms as used in triangulation

i). Rigorous method

ii). Semi - rigorous method (4 Marks).

b). The coordinates of stations S, A and L in Fig.3, were provided as $N_S = 1170.5$ m, $E_S = 1309.12$ m, $N_A = 958.87$ m, $E_A = 1525.43$ m, and finally $N_L = 565.81$ m, $E_L = 1231.08$ m. Determine the coordinates of point B which has been located by intersection from stations, S, A and L by observing the following angles: $BSA (\alpha) = 85^\circ 38' 49''$, $SAB (\gamma) = 55^\circ 50' 53''$, $BAL (\delta) = 41^\circ 41' 48''$ and $BAL (\Phi) = 68^\circ 09' 32''$ (4 Marks).

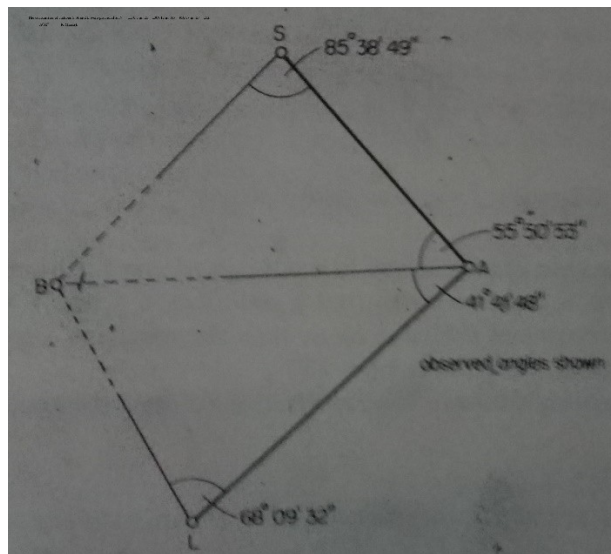


Fig 3. Intersection

c). Derive the parameters for locating unknown point using intersection by triangle solution (12 Marks).