



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

END OF SEMESTER EXAMINATION

SERIES: DECEMBER 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 and 30 Marks for BSc

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

$$\Phi A = 74^{\circ} 04' 25''$$

$$\Phi B = 43^{\circ} 35' 47''$$

$$\Phi C = 62^{\circ} 19' 48''$$

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)

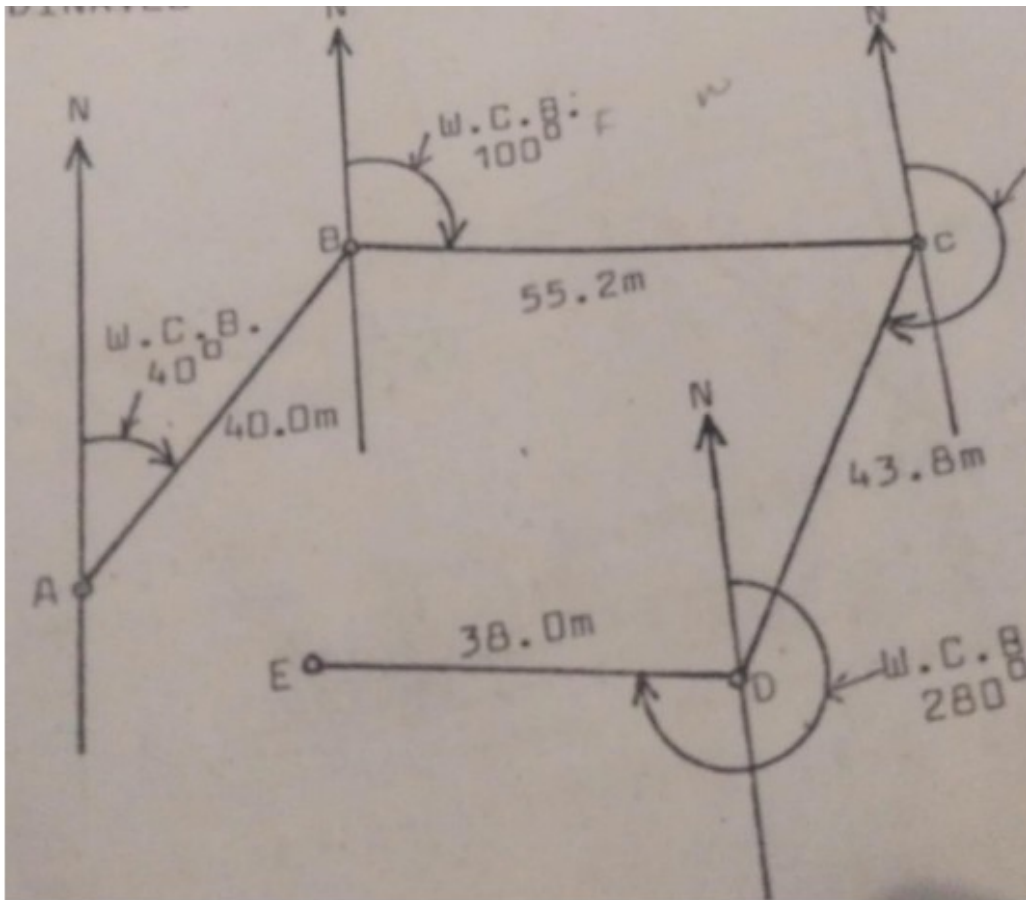


Fig. 1. An open traverse ABCD and E

c). Explain the following terms as used in theodolite traversing

- i). Azimuth
- ii). Seasonal variations
- iii). Magnetic declination
- iv). True bearing
- v). Assumed bearings

(10 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	233.123
N	959.220	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 ($98.45, 326^{\circ} 23' 30''$)

(12 Marks).

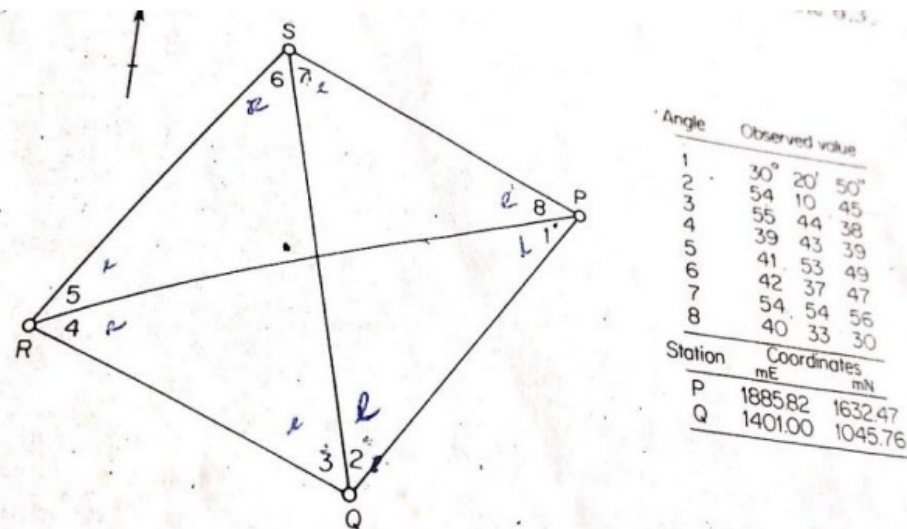
b). Discuss factors essential in traversing

(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).



- a). A traverse was run from Donga to Twiga (See Table 1). The details were recorded was provided as follows:

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

Compute or adjust the new bearings for the traverse **(20 Marks).**

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Compute or adjust the new bearings for the traverse (20 Marks).

Station	Observed bearing	Orientation corr	Oriented bearing	Adjust.	Final bearing
At Donga	Field notebook Pg1				
Nyoka	237° 01' 02"				
K _o	251° 43' 54"				

QUESTION FIVE (20 Marks)

At K ₁₀					
K ₉	146° 19' 30"				
K ₁₁	338° 06' 22"				
At K ₁₁					
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

Explain the following techniques used in the adjustment of bearings in a controlled network

- Rigorous method
- Semi - rigorous method (4 Marks).
- 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: $\angle BSA (\alpha) = 85^\circ 38' 49''$, $\angle SAB (\gamma) = 55^\circ 50' 53''$, $\angle BAL (\delta) = 41^\circ 41' 48''$ and $\angle BAL (\Phi) = 68^\circ 09' 32''$ (4 Marks).

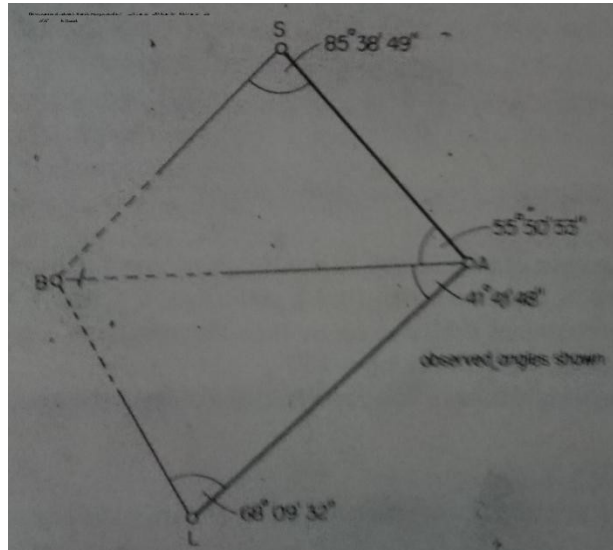


Fig 3. Intersection

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