



TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR:

TCV 4225 : ENGINEERING SURVEY - II

BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: MARCH 2025

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). Describe the following terms as applied in theodolite traversing
- i). Transiting
 - ii). Swinging the telescope
 - iii). Changing the face
 - iv). Axis of the telescope
- v). Horizontal axis
- b). Discuss the following methods of measuring horizontal axis
- i). Ordinary Method
 - ii). Repetition Method

(10 Marks).



- iii). Reiteration Method (6 Marks).
- c). Given the following whole circle bearing for three sides of a triangle, determine internal angles:
- | Side | WCB |
|------|--------------|
| AB | 93° 24' 22" |
| BC | 31° 12' 16" |
| CA | 239° 58' 35" |
- (3 Marks).
- d). What is centering in theodolite traversing? (1 Mark).

ANSWER ANY TWO QUESTIONS FROM THIS SECTION

QUESTION TWO (20 Marks)

- a). With an aid of a sketch, explain the method of intersecting a point using **Intersection by solution of triangle** and subsequently obtain the coordinates (10 Marks).
- b). Given the following details, determine interior angles and the distances of the triangle ABC
- | | | |
|---|-----------|----------|
| A | + 2229.02 | +825.70 |
| B | +3517.08 | +1119.78 |
| C | +2011.08 | + 897.64 |
- (10 Marks).

QUESTION THREE (20 Marks)

Given the following information, compute the new coordinates K_6 , K_7 , K_8 , K_9 , K_{10} , and K_{11} . The details were Donga to K_6 (251° 44' 00" and 336.139 m), K_6 to K_7 (354° 03' 22" and 272.315 m), K_7 to K_8 (43° 08' 09" and 479.504 m), K_8 to K_9 (05° 20' 53" and 366.565 m), K_9 to K_{10} (326° 19' 50" and 206.299 m), K_{10} to K_{11} (338° 06' 50" and 334.472 m) and finally, K_{11} to Twiga (298° 32' 40" and 430.924 m). Determine the new coordinates through applying Bowditch Method for correction of errors and the datum coordinates were

Station	N (m)	E (m)
Donga	26 549.36	68 6431.50
Twiga	28 162.86	68 5828.56

(20 Marks).

QUESTION FOUR (20 Marks)



A traverse was run from Donga to Twiga. The details were recorded 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 2714.040

Prepare a bearing sheet (C22) using the table below (Table 1). (20 Marks).

Station	Observed bearing	Orientation correction	Oriented bearing	Adjust.	Final bearing
At Donga	Field notebook Pg1				
Nyoka	237° 01' 07"				
K ₁	251° 43' 54"				
Twiga	338° 58' 15"				
At K₁					
Donga	71° 43' 34"				
K ₁	354° 02' 54"				
At K₁	Field notebook Pg2				
K ₁	174° 02' 52"				
K8	43° 07' 38"				
At K₁	Field notebook Pg3				
K ₁	223° 07' 39"				
K ₁	05° 20' 21"				
At K₁					
K ₁	185° 20' 24"				
K ₁₀	326° 19' 27"				
At K₁₀					
K ₁	146° 19' 31"				
K ₁₁	338° 06' 22"				
At K₁₁					
K ₁₀	158° 06' 37"				
Twiga	298° 32' 26"				
At Twiga					
K ₁₁	118° 32' 31"				
Donga	158° 58' 09"				
JKU	220° 00' 47"				220° 01' 5"

Table 1: Bearing sheet (C22)

QUESTION FIVE (20 Marks)

- a). Discuss the following types of bearings as applied in Theodolite traversing
- i). Azimuth

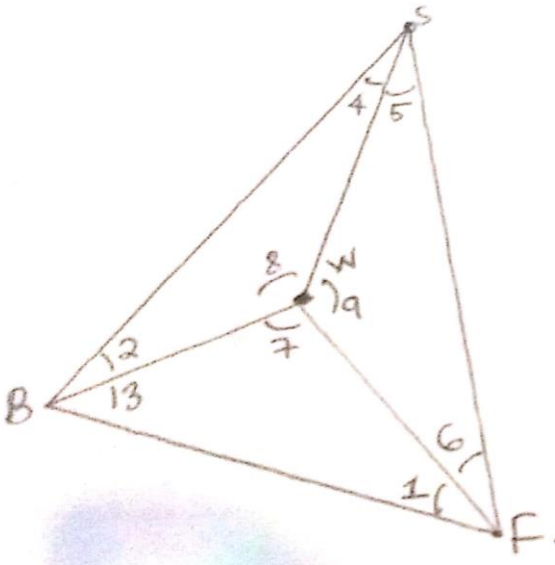


- ii). Magnetic bearing
- iii). Magnetic declination

(6

Marks).

- b). The field abstract for a triangular scheme established for a small construction site in **Fig.2**. Using the data provided below, using equal shifts adjustment, determine the correct angles
(14 Marks).



Angle	Observed value
1	26° 10' 48"
2	27° 37' 16"
3	35° 46' 10"
4	32° 57' 52"
5	28° 23' 12"
6	29° 04' 37"
7	126° 11' 59"
8	111° 15' 32"
9	122° 32' 02"

Fig 2: Triangular scheme