TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF ENGINEERING AND TECHNOLOGY

Department of BUILDING & Civil engineering

UNIVERSITY EXAMINATION FOR:

BACHELOR OF SCIENCE IN CIVIL ENGINEERING AND BACHELOR OF TECHNOLOGY

ENGINEERING SURVEY - II

ECV 4224/ ECV 4326 AND TCV 4225 : ENGINEERING SURVEY - II

END OF SEMESTER EXAMINATION

SERIES: APRIL 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 for BTech and 30 Marks for BSc

a) Given the following information, compute the new coordinates K_6, K_7, K_8, K_9, K_{10}, and K_{11}. The details were provided as follow: Donga to K_6 (251^0 44′ 00′′ and 336.139 m), K_6 to K_7 (354^0 03′ 22′′ and 272.315 m), K_7 to K_8 (43^0 08′ 09′′ and 479.504 m), K_8 to K_9 (05^0 20′ 53′′ and 366.565 m), K_9 to K_{10} (326^0 19′ 50′′ and 206.299 m), K_{10} to K_{11} (338^0 06′ 50′′ and 334.472 m) and finally, K_{11} to Twiga (298^0 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	26 549.360	68 6431.510	
Twiga	28 162.860	68 5828.560	
Nyoka	23 857.590	68 2214.040	**(20 Marks).**

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

i) Swinging the telescope
ii) Face left
iii) Changing the face
iv) Axis of the telescope
v) Permanent adjustment **(10 Marks)**.

ANSWER ANY TWO QUESTIONS FROM THIS SECTION

QUESTION TWO (20 Marks)

a). Given the following coordinates, determine interior angles, bearings and distances of triangle ABC

A	+ 2229.02	+825.70	
B	+3417.08	+1118.77	
C	+2011.08	+ 897.64	**(10 Marks).**

b) . Explain the following terms.

i) Azimuth
ii) Assumed bearing
iii) Magnetic declination
iv) Magnetic bearing
v) True bearing

QUESTION THREE

a) Using the intersection by solution of triangle, discuss how you can intersect unknow point and determine its coordinates **(10 Marks)**.

b) Explain the processes of Bowditch and Transit methods (6 Marks).

c) Differentiate between rigorous and semi - rigorous methods (4 Marks).

QUESTION FOUR

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

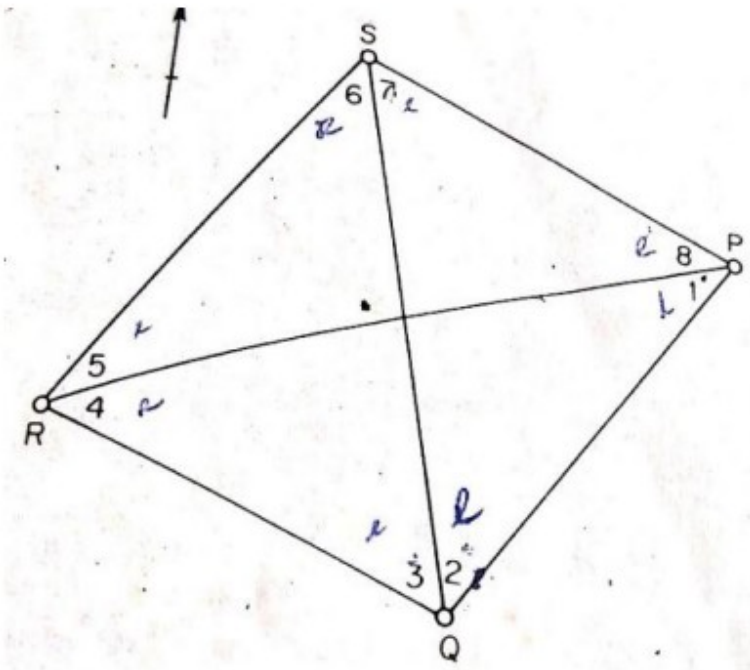
Station	**N (m)**	**E (m)**
Twiga	+28 162.860	+68 5828.560
Donga	+26 594. 360	+ 68 6431.520
Nyoka	+ 23 857.590	+ 68 2214.040

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

Station	Observed bearing	Orientation corr	Oriented bearing	Adjust.	Final bearing
At Donga	**Field notebook Pg1**				
Nyoka	237^0 01′ 02″				
K_6	251^0 43′ 54″				
Twiga	338^0 58′ 10″				
At K_6					
Donga	71^0 43′ 36″				
K_7	354^0 02′ 54″				
At K_7	**Field notebook Pg2**				
K_6	174^0 02′ 52″				
K8	43^0 07′35″				
At K_8	**Field notebook Pg3**				
K_7	223^0 07′ 40″				
K_9	05^0 20′ 22″				
At K_9					
K_8	185^0 20′ 21″				
At K_{10}					
K_9	146^0 19′ 30″				
K_{11}	338^0 06′ 22″				
At K_{11}					
K_{10}	158^0 06′ 40″				
Twiga	298^0 32′ 24″				
At Twiga					
K_{11}	118^0 32′ 24″				
Donga	158^0 58′ 09″				
JKU	220^0 00′ 45″				220^0 00′53″

QUESTION FIVE (20 Marks).

The field abstract of Fig 1 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.



Angle	Observed value		
1	30°	20'	50"
2	54	10	45
3	55	44	38
4	39	43	39
5	41	53	49
6	42	37	47
7	54	54	56
8	40	33	30

Station	Coordinates mE	mN
P	1885.82	1632.47
Q	1401.00	1045.76

Fig 2. Braced quadrilateral