TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ARCHITECTURE & BUILT ENVIRONMENT

UNIVERSITY EXAMINATION FOR:

BACHELOR OF SCIENCE IN CIVIL ENGINEERING

ECV 4316: **ENGINEERING SURVEY III**

END OF SEMESTER EXAMINATION

SERIES: JANUARY 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) (30 MARKS).

a) You have been asked to take the dumpy level from the Survey Lab, Technical University of Mombasa and carryout levelling work starting at Gate A all along to Gate B. Assuming bellow shown, is the staff readings and the reduced level at point A, which is 0 distance to B, 500 m away and recorded in the field book. Do the following.

(i) Calculate and fill the Rise, Fall and Reduced level columns.

(ii) Apply checks **(10 Marks)**

B. S	I.S	F. S	Rise	Fall	Reduced Level	Distance(m)	Remarks
3.125						0	A Ground level
	2.975					100	S_1
0.875		2.185				200	S_2
	2.O15					300	S_3
1.265		1.755				400	S_4
		1.845				500	B Ground level

a). State and explain types of errors that are encountered when carrying out linear surveying and measures taken to ensure that they are minimized(correction). **(10 Mark)**

b). Discuss factors that must be considered during the selection of survey stations before the process of linear surveying is undertaken. **(10 Marks).**

c) Define the word reconnaissance and explain the purpose of carrying out reconnaissance before surveying is conducted. **(10 Marks)**

QUESTION TWO (20 MARK)

a). Explain the meaning of the following surveying words as used in booking, when writing the field book. **(10 Marks).**

(i) Backsight

(ii) Foresight

(iii) Intermediate sight

(iv) Reduced level

(v) Change points (**10 Marks)**

b). Discuss Pythagorean Theorem as applied in linear surveying **(10 Marks).**

QUESTION THREE (20 MARKS)

a). With an aid of a sketch name parts of a tilting level

b). Discuss the factors that must be considered during the process of reconnaissance survey **(10 Marks)**

QUESTION FOUR (20 MARKS)

a) Define the following word

(i) Contour

(ii) Reciprocal levelling **(4 Marks)**

b) State the characteristics of contour lines **(6 Marks)**

c) Reciprocal levelling observation is made in both directions to eliminate the effect of refraction and the curvature of the earth; explain by giving an example.

(10 marks)

QUESTION FIVE (20 MARKS)

a). In levelling across a river, reciprocal levelling observations gave the following results for the staff held vertically at points X and Y from level stations A and B on each bank respectively.

Level at point X, the height of collimation was 1.650 m
The reading of the Staff on Y was 1.635 m.
Level at point Y, the height of collimation was 1.632m.
The reading of Staff on X was 1.625 m.

Determine the reduced level of Y if the reduced of X was 7.04 m A.O.D, and the collimation error of the instrument **(4 Marks).**

b). Show that curvature and refraction combined is given by the following expression:
$C\&R = 0.673\,L^2 \;\; where\ L\ is\ in\ Kilometres$ (**14 Marks).**

c). What is an offset? **(2 Marks).**