



TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF ENGINEERING AND TECHNOLOGY DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR THE BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING

TCV 4218: ENGINEERING SURVEY - I

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

-Drawing instruments.

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). Giving examples, discuss the following of error
- Gross errors
 - Systematic errors (6 Marks).
- b). The following table contains extracts from a level field note book, with some entries being illegible due to rain exposure. Fill in the blanks and carryout arithmetic checks for your answers (10 Marks).



B.S	I.S	F.S	H.I	R. levels	Remarks
?			280.1	278.27	TBM
	2.01			?	A
	?			277.06	B
3.89		0.45	?	279.65	C

- c). Two points X and Y were 700 m apart. A level was set up at X and Y in turn and the following readings were taken: Level at X. Height of Collimation read 1.708 m. Reading of the staff on Y was 1.625 m. Level at Y. Height of Collimation read 1.695 m. Reading of the on X was recorded as 1.675 m. Calculate the reduced level of point Y if the reduced level of X is 100 m A.O. D (4 Marks).

ANSWER ANY QUESTION FROM THIS SECTION

QUESTION TWO (20 Marks).

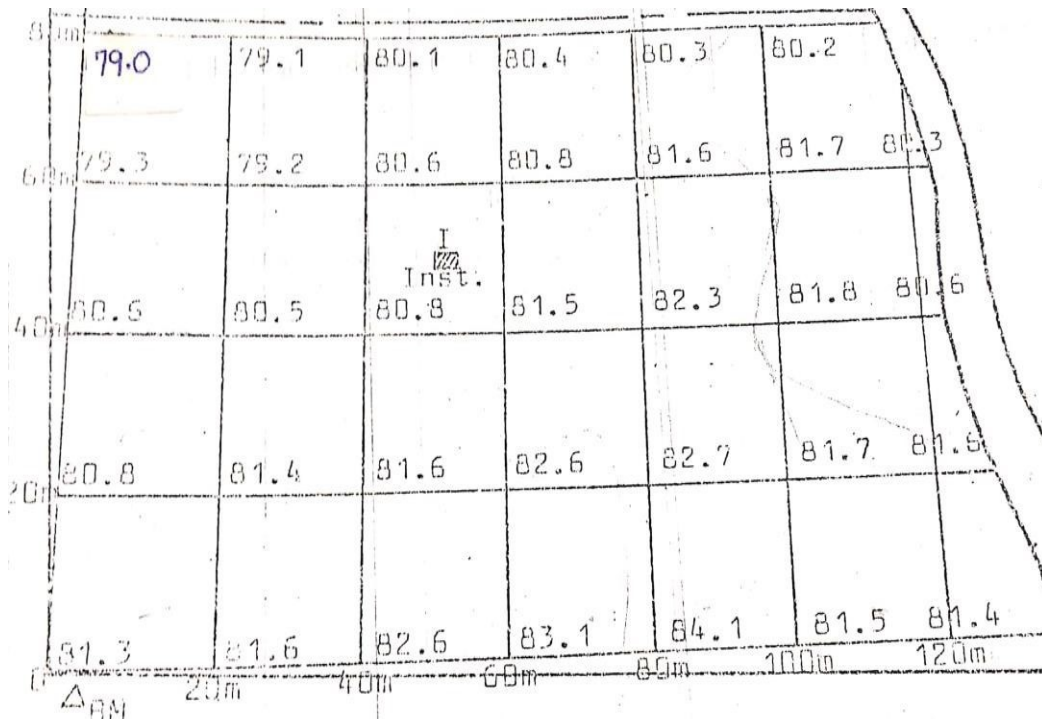
- a). Explain the procedure of overcoming an obstruction across a pond (10 Marks).
- b). A 30 m bay of a baseline was measured using a 30 m steel band that had been standardized in a catenary at a tension of 90 N and a temperature of 12°C. The following information was obtained:
- Applied tension = 65 N
 - Temperature in the field = 15°C
 - The radius of Earth's curvature = 6370 Km
 - The differences in height between the two points = 0.52 m
 - The altitude of the base = 1600 m above sea level
 - Cross-sectional area of the tape = 3.6 mm²
 - Young Modulus of Elasticity (E) = 2.1×10^{11} N/mm²
 - Coefficient of Linear Expansion (α) = $11 \times 10^{-6}/^{\circ}\text{C}$

Determine the five-correction applied on the steel tape (10 Marks).

QUESTION THREE (20 Marks).



- a). The following levels were taken levels were taken to generate a contour map for the purpose of setting out a building. Derive the required contours **(12 Marks).**



- b). Derive the formula for curvature correction **(8 Marks).**

QUESTION FOUR (20 Marks).

- a). Discuss factors that are considered during reconnaissance survey **(10 Marks).**
- b). Define the following terms used in levelling
- Backsight
 - Foresight
 - Reduced level
 - Height of Collimation
 - Change Points
- (10 Marks).**

QUESTION FIVE (20 Marks).

- a). With an aid of a sketch, discuss the process of reciprocal levelling **(14 Marks).**



- b). What factors should one consider when choosing vertical interval during contouring process **(6 Marks).**

