



# TECHNICAL UNIVERSITY OF MOMBASA

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## 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
- i). Gross errors
  - ii). 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
	1.74			282.46	D
	1.08			?	E
		0.78		282.76	F

- 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:

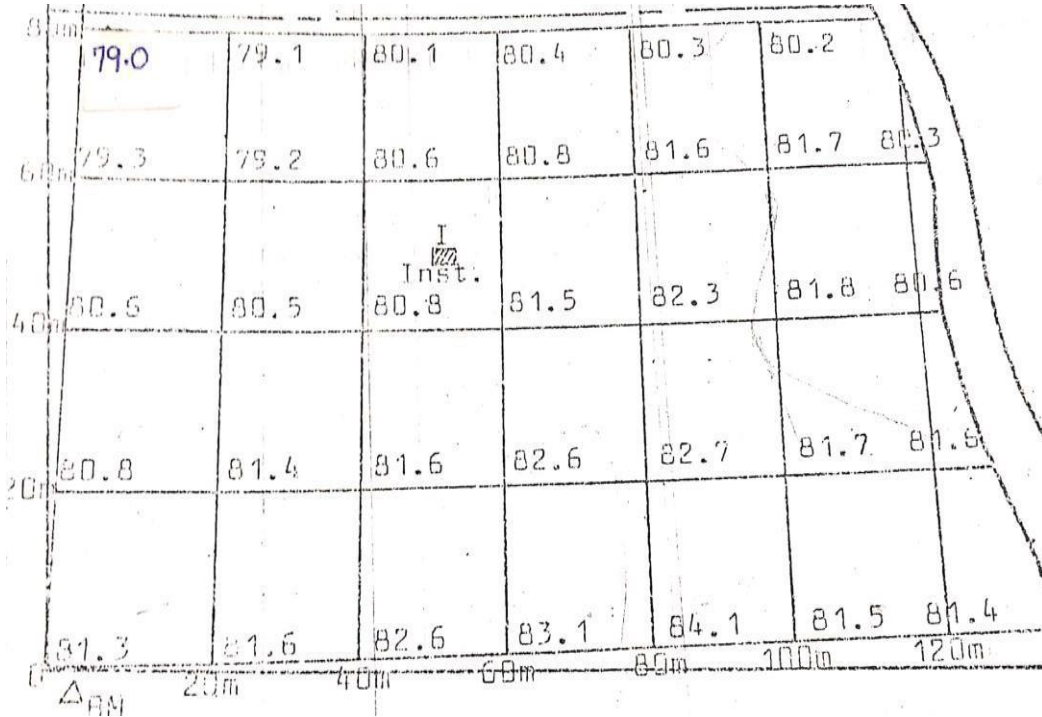
- Applied tension = 65 N
- Temperature in the field = 15°C
- The radius of Earth's curvature = 6370 Km
- The differences in height between the two points = 0.52 m
- The altitude of the base = 1600 m above sea level
- Cross-sectional area of the tape = 3.6 mm<sup>2</sup>
- Young Modulus of Elasticity (E) = 2.1\*10<sup>11</sup> N/mm<sup>2</sup>
- Coefficient of Linear Expansion ( $\alpha$ ) = 11 \*10<sup>-6</sup>/°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

- i). Backsight
- ii). Foresight
- iii). Reduced level
- iv). Height of Collimation
- v). 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).**

