



TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF ARCHITECTURE & BUILT ENVIRONMENT
UNIVERSITY EXAMINATION FOR:
BACHELOR OF ARCHITECTURAL STUDIES/ARCHITECTURE
BACHELOR OF SCIENCE IN CIVIL ENGINEERING
EAR 4205/ECV 4316: ENGINEERING SURVEY III
SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: JULY 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). The following table contains extracts from a level field notebook, with some entries 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.L	Remarks
?			279.08	277.65	O.B.M
	2.01			?	A
	?		?	278.07	B
3.37		0.40		278.68	C
	2.98			?	D
	1.41			280.68	E
		0.68		281.37	F

b) Your supervisor has assigned you the task of performing linear surveying. A pond is encountered as an obstacle on the survey line. Explain any two possible solutions to the problem. **(10 Marks)**

c) With an aid of sketch

(i) Name parts of the dump level

(ii) Discuss some of the factors that may be considered during the process of reconnaissance survey **(10 Marks)**

QUESTION TWO

a). Explain the method of reciprocal levelling, including all the equations involved.

(14 Marks).

b). Explain the following terms as used in levelling

i). Backsight

ii). Foresight

iii). Reduced level

iv). Intermediate sight

(6 Marks).

QUESTION THREE

a). Using a sketch discuss curvature and refraction corrections

(14 Marks).

b). You have been tasked to carry out contouring. What factors do you consider when deciding on the vertical interval to be used? **(6 Marks).**

QUESTION FOUR

a). What is direct contouring?

(2 Marks).

- b). **What is Indirect contouring?** Figure 1, shows a network of spot levels shown was observed during the process of contouring a site for the construction of a building. Given that the square grids were at intervals of **20 metres**, draw contour lines at **1.0-metre** vertical intervals **(14 Marks).**

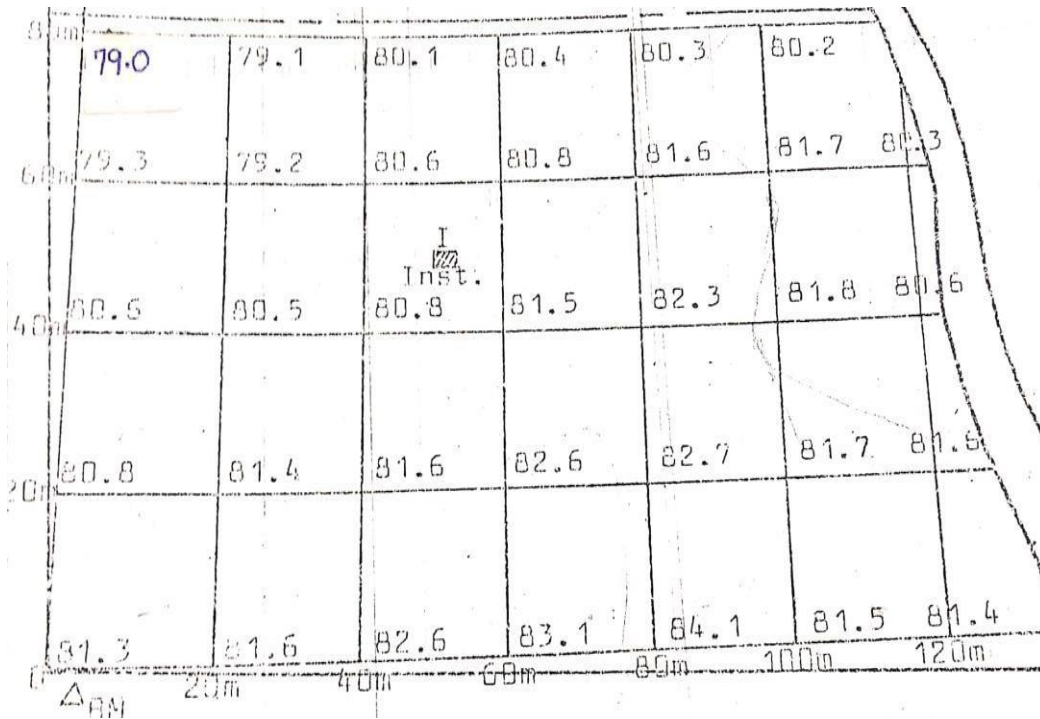


Fig 1: Network of spot heights

- c). 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.

Staff reading of X from A = 2.675m

Staff reading of X from B = 3.015m

Staff reading of Y from A = 3.750 m

Staff reading of Y from B = 3.975 m

If the Reduced level of X is 160 m AOD, determine the level of Y **(4 Marks).**

QUESTION FIVE

- a) .Discuss pythagoreen theorem as applied in linear surveying **(10 Marks)**
- b) Reciprocal levelling observation is made in both directions to elliminate the effects of refraction and curvature of the earth: Explain by giving an example. **(10 Marks)**