TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ARCHITECTURE & BUILT ENVIRONMENT

UNIVERSITY EXAMINATION FOR:

BACHELOR OF ARCHITECTURAL STUDIES/ARCHITECTURE

EAR 4205: **ENGINEERING SURVEY**

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
	1.4.1			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).**

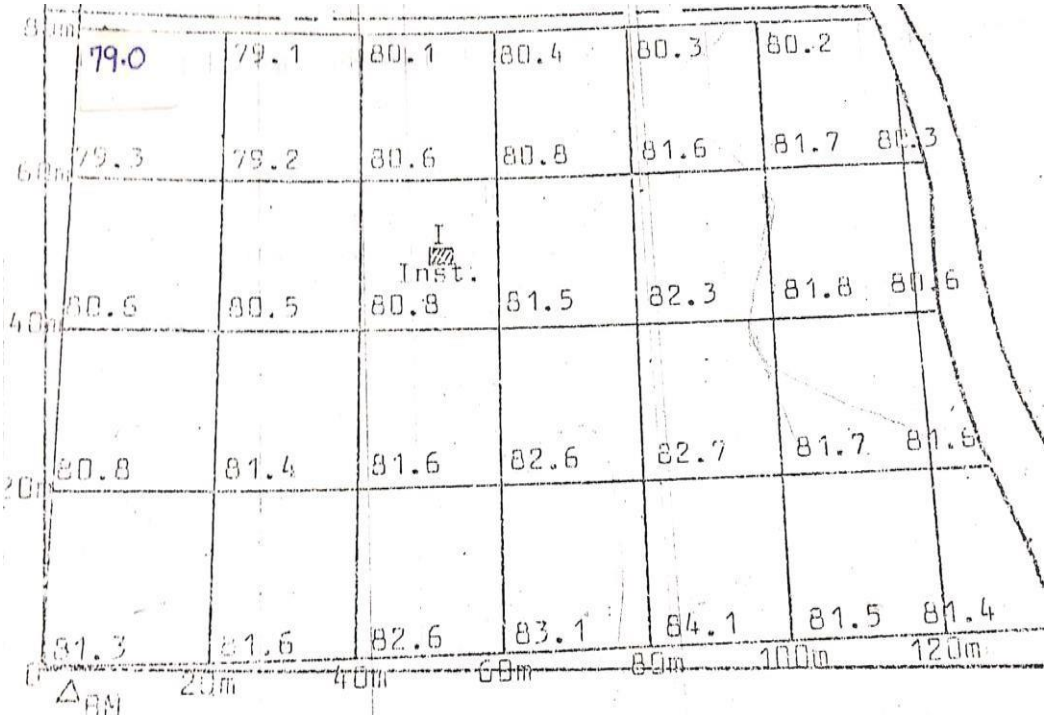

Fig 1: Network of spot heights

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)**