



TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR:

BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING

TCV 4318 & ECV 4318 & ECV 4418 : ENGINEERING SURVEYING - 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 - 20 Marks for BTCE and 30 Marks for BSc)

- a). The center - line of a proposal railway consists of two straightlights joined by a curve of 600 m radius. The angle of deflection between the two straights is 46° , and the chainage (increasing from left to right) of their intersection is 7367 m. Tabulate the data required to set out the curve using a chord length of 30 m using a chain and a theodolite **(10 Marks)**.
- b). Coordinates (E, N) of corners of a polygonal area of ground were taken as follows A (0,0), B (-32,40), C (-41,126), D (14,200), E (80,144), F (108,62), G (27, -19) returning to A. Calculate



the area enclosed to the nearest hectares. Assume that the tape used had nominal length of 20 m and was found to be 0.1 m too long, what would be the corrected value of the area? **(10 Marks).**

- c). A cutting is to be made in the ground which had a traverse slope of 1:5. The width of formation was 8.00 m and the side slopes are 1 vertical to 2 horizontals. If the depths of the centre lines of three sections of 20 metres apart were 2.50, 3.10 and 4.30 m respectively, compute the volume of the earth involved in this length of cutting **(10 Marks).**

ANSWER ANY TWO QUESTIONS FROM THIS SECTION

QUESTION TWO (20 Marks)

- a) In a tape offset survey, the following offsets were taken to a fence from a survey line.

Calculate the area in to the nearest hectares

(8 Marks).

Chainage (m)	0	20	40	60	80
Offset (m)	0	5.49	9.14	8.53	10.67
Chainage (m)	100	120	140	160	180
Offset (m)	12.50	9.75	4.57	1.83	0

- b). With an aid of a skech show that the widths of a section with a cross - fall is given

by:

$$W_1 = \left(\frac{b}{2} + mh\right) \left(\frac{k}{k-m}\right)$$

$$W_2 = \left(\frac{b}{2} + mh\right) \left(\frac{k}{k+m}\right)$$

(12 Marks)

QUESTION THREE

- a). The Fig 1. Shows a rectangular plot which was to be excavated to the given depths. The depth of formation was provided as 10 m. Assume the vertical sides, and other details were: depths were A (13.15), B (13.70), C (14.33), D (13.94), E (14.80), F (14.97), G (15.17), H (16.10) and J (14.67). Compute the volume to be excavated assuming the area is subdivided into triangles and rectangles

(12 Marks).

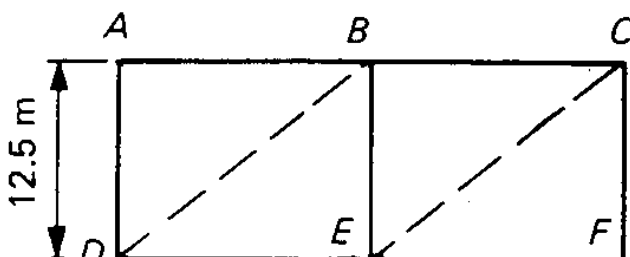


Fig 1. Rectangular plot to be excavated

Fig 1. Area of excavation

- b). A road has a formation breadth of 10 m, and side slopes of 1 in 1 cut, and 1 in 3 in fill. The original ground had a cross fall of 1 in 5. If the depth of excavation of the centre lines of two sections 30 metres apart were provided as 0.6 and 0.8 metres respectively, compute the volumes of the **cut** and **fill** over this length **(6 Marks)**.
- c). The areas within the underwater contour lines of a reservoir are as follows:

Contour (m AOD)	190	188	186	184	182
Area (m ²)	3150	2460	1630	840	210

Use the Trapezoidal rule, using the End Area and Prismoidal rules **(2 Marks)**.

QUESTION FOUR

- a). Make short notes under the following:
- i). Roadway excavation
 - ii). Burrow excavation and hauling
 - iii). Embankment Construction
 - iv). Protection of Earthworks **(8 Marks)**
- b). The following table gives the area of cut and fill necessary at intervals along the line of a proposed new road as determined from the measured cross sections. Determine the accumulated volume **(10 Marks)**.

Chainage	Volume		Volume		Accumulated volume
	Cut	Fill	Cut	Fill	
0					
50	22				

QUESTION FIVE (20 Marks)

- a). Tabulate the data required to set out a simple circular curve using **a tape and a chain** a circular curve of 600 m to connect by two straights, with a deflection angle of $18^{\circ} 24'$, given that the chainage of the intersection point (I) is 2140 m **(10 Marks)**.
- b). Explain parts of a planimeter **(10 Marks)**.

