



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR:

BACHELOR OF SCIENCE IN CIVIL ENGINEERING

(INSTITUTIONAL BASED EXAMINATION)

ECE 2306 : ENGINEERING SURVEY III

END OF SEMESTER EXAMINATION

SERIES: MARCH 2017

TIME: 2 HOURS

DATE: 3rd April

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 any THREE questions.

Do not write on the question paper.

QUESTION ONE (Compulsory)

- a) Tabulate the data required to set out a simple circular curve using a chain and a tape. The radius of the curve is given as **600 m** connecting two straights deflecting at an angle of **18°24'** and the chainage of the intersection **I** is **2140 m** (use standard chord of 20 m).

(14 Marks)

- b) The coordinates of a polygon A, B, C, D and E were recorded as follows:

Station	E (m)	N (m)
A	200.00	300.00
B	206.98	285.65
C	368.93	282.02
D	395.93	248.80
E	200.94	185.70

If the chain used nominally during the measurements was found to be 0.1 m too long, determine the corrected area of the plot to the nearest hectares. (10 Marks)

- c) A road has a formation breadth of 10 m and the side slopes of 1 in 1 cut, and 1 in 3 fill. The original ground has a cross –fall of 1 in 5. If the depth of excavation of two sections 25 m apart are 0.8 and 1.2 m respectively, calculate the volumes of both the cut and the fill over this length. (6 Marks)

Attempt any TWO questions

QUESTION TWO

- a) The figure 1, below shows the existing ground levels on a 20 m square grid forming part of a site which is to be excavated to a uniform formation level of 10.00 m above the datum. By assuming that the figure is divided in to triangular and rectangular shapes, calculate the volume of earth to be excavated assuming vertical sides. (14 Marks)

- b) Using the appropriate formulae where applicable, explain ANY three methods applied in the determination of the areas of irregular figures. (8 Marks)

QUESTION THREE

- a) In order to find the excavation required for a railway cutting, cross – sections were taken at every 40 m. As the ground surface was very irregular, the cross-sections were plotted and their areas obtained by planimeter, the results were provided as follows:

<i>Chainage of section (m):</i>	1840	1860	1890	1920	1950	1980	2010	2040	2070	2100	2130	
<i>Area in M²</i>	:	24	196	248	101	200	296	363	320	90	140	50

Determine the volume of excavation in m³ using both the end area and prismatic formulas. State which of the above answers you consider to be the more accurate, giving reasons. (12 Marks)

- b) Using a sketch, derive the formula for the widths **W₁** and **W₂** of a section with a cross-fall. (8 Marks)

QUESTION FOUR

- a) Derive the data required to set out a kerb line of radius 10 m with a deflecting angle of 90° , where offset required are set out at an interval of 2.5 m. (10 Marks)
- b) Tabulate the data required to set out a simple circular curve using a theodolite and a chain. The curve has a radius of 600 m, connecting two straights having a deflection angle of $18^{\circ}24'$, given chainage at the intersection point (I) as 2140.0 m. (10 Marks)

QUESTION FIVE

- a) A cutting is to be made in the ground which has a traverse slope of 1:5. The width of the formation was 9.0 m and the side slopes are 1 vertical to 2 horizontal. If the depths of the center lines of the three sections of 20 m apart were 2.5, 5.10 and 7.30 m respectively. Determine the volume of the earth over this length. (14 Marks)
- b) State Simpson's rule. Determine the area of a plot given the offsets scaled from a plan at an interval of 20 m. The information was provided as follows:

Offset (m):	O ₁	O ₂	O ₃	O ₄	O ₅	O ₆	O ₇	O ₈	O ₉	O ₁₀
Length (m):	16.78	19.81	20.44	19.23	16.76	18.68	17.68	17.37	16.76	18.68

(6 Marks)