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: APRIL 2017

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 any THREE questions.
Do not write on the question paper.

QUESTION ONE (Compulsory)

a) A cutting is to be made in the ground which has a traverse slope of 1in 4. The width of the formation was 8.00 m and the side slope is 1 vertical to 2 horizontal. If the depths of the center lines of the three sections of 20 m apart were 4.5, 6.10 and 8.30 m respectively. Determine the volume of the earth over this length.   (14 Marks)

b) Coordinates (E, N) of corners of a polygonal plot area of ground were provided as follows in metres,

A (0, 0), B (-32, 40), C (-41, 126), D (14, 200), E (80, 144), F (108, 62) and G (27, -19), returning back to A. Determine the area enclosed by the plot. If the steel tape used 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). State Simpson's rule. In a chain survey, the following offsets were taken to a fence from a chain line:

Chainage (m): 0   30   60   90   120   150   180   210   240   270
Offset (m):   0   5.49 9.14 8.53 10.67 12.50 9.75 4.57 1.83   0

Find the area enclosed by the chain and the fence in hectares. (6 Marks)

Attempt ant TWO questions
QUESTION TWO

a) At a certain station, an embankment formed on level ground has a height at it's center line of 3.10 m. if the breadth of formation was 12.50 m, determine the side widths and the area of the cross – sections given that the side slopes was 1 vertical to 2.5 horizontal. (4 Marks)

b) 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 **$18^024'$** and the chainage of the intersection **I** is **2140** m (use standard chord of 20 m). (12 Marks)

c) 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

(4 Marks).

QUESTION THREE

a) The fig 1, below shows a rectangular plot which is to be excavated to a uniform formation level of 10.00m above the datum. Assuming the sides to be vertical, calculate the volume of the earth to be excavated when the area is subdivided into rectangles and triangles. (12 Marks)

b) Using a sketch derive the elements of a simple circular curve. (8 Marks)

QUESTION FOUR

a) A road has a formation breadth of 9.00 m and the side slopes of 1 in 1cut, and 1 in 3 fill. The original ground has a cross -fall of 1 in 5. If the depths of excavation of two sections 20 m apart are 0.4 and 0.6 m respectively, calculate the volumes of both the cut and the fill over this length. (7 Marks)

b) Tabulate data needed to set out by theodolite and chain a circular curve of radius 600 m to connect two straights having a deflection angle of $18^0 24'$. The chainage of the intersection point was provided as 2140.0 m. (13 Marks)

QUESTION FIVE

a) Describe parts of a planimeter. What is the area of a piece of land which has a plan area of 1613 mm^2 as measured by a fixed – arm planimeter if the scale of the plan is 1:2500? (12 Marks)

b) The areas within the underwater contour lines of a lake were provided as follows:

Contour (m AOD):	190	187	185	182	179
Area (m2):	3150	2460	1630	840	210

Calculate the volume of water in the lake between the 179 and 190 m contours by using End Area and Prismoidal formulas. (4 Marks)

c) Describe GIVE and TAKE lines and COUNTING SQUARES in regard to determination of areas of irregular figures. (4 Marks)