TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR:

BACHELOR OF SCIENCE IN CIVIL ENGINEERING

ECE 2306 : ENGINEERING SURVEY III

END OF SEMESTER EXAMINATION

SERIES: DECEMBER 2016

TIME: 2 HOURS

DATE:

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 1:5. The width of the formation was 10 m and the side slope are 1 vertical to 2 horizontal. If the depths of the center lines of the three sections of 25 m apart were 4.5, 6.10 and 8.30 m respectively. Determine the volume of the earth over this length
(14 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 **800 m** connecting two straights deflecting at an angle of **$18^0$24'** and the chainage of the intersection **I** is **2240** 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 TWO

a). Define the following terms as used in **Mass Haul Diagrams:**

i). Mass Haul Diagram (2 Marks).

ii). Haul distance (2 Marks).

iii). Overhaul distance (2 Marks).

iv). Shrinkage (2 Marks).

v). Haul (2 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 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).

Question THREE

a). A road has a formation breadth of 8 m and the side slopes of 1 in 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 30 m apart are 0.8 and 1.2 m respectively, calculate the volumes of both the cut and the fill over this length (7 Marks).

b). Using a sketch derive the elements of a simple circular curve (13 Marks).

Question FOUR

a). Using a sketch derive the formula for the widths $\mathbf{W_1}$ and $\mathbf{W_2}$ of a section with a cross-fall (10 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 **$18^0$24'** and the chainage of the intersection **I** is **2140** m (use standard chord of 20 m) (10 Marks).

Question FIVE

a) In order to find the excavation required for a railway cutting cross – section were taken at every 20 m. As the ground surface was irregular, the cross –sections were plotted and their areas obtained using a planimeter. The results were tabulated as follows:

Chainage (m):	1840	1860	1880	1900	1920	1940	1980	2000	2020	2040
Area (m^2):	34	296	348	201	297	396	462	189	243	149

(10 Marks).

b). Using appropriate formulas describe any FOUR methods of determining areas of irregular figures (10 Marks).