THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

((A Constituent College of JKUAT)

(A Centre of Excellence)

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR DEGREE IN BACHELOR OF SCIENCE IN CIVIL ENGINEERING

ECE 2306: ENGINEERING SURVEY III

END OF SEMESTER EXAMINATION
SERIES: AUGUST 2012
TIME ALLOWED: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*
- *Scientific Calculator*

This paper consists of **FIVE** questions.
Answer question **ONE (COMPULSORY)** and any other **TWO** questions
Maximum marks for each part of a question are as shown
This paper consists of **THREE** printed pages

Question One (Compulsory - 30 Marks)

a) In order to find the excavation required for a railway line cutting, cross-sections are taken at every 30.00m. As the ground surface is very irregular, the cross-sections were plotted and their areas obtained by plarimeter. These results were as follows:

Chainage of Section (M):	1860	1890	1920	1950
Area in M^2:	34	200	196	100
Chainage of Section (M):	1980	2010	2040	2070
Area in M^2:	198	296	368	320
Chainage of Section (M):	2100	2130	2170	
Area in M^2:	120	150	49	

i) Calculate the volume of the excavation in M^3 using End Area formula and Prismoidal formula **(12 marks)**

ii) State which of the above answers you consider to be more accurate, give reasons. **(2 marks)**

b) A canal has a formation breadth of 10.00 and side slopes of 1 in 1.5 cut, and 1 in 4 in fill. The original ground had a cross fall of 1 in 6. If the depth of excavation at the centre-line of two sections 20m apart and are 0.8 and 1.2m respectively, find the volume of cut and fill over this length. **(6 marks)**

c) Using a sketch with cross-fall, derive the expression for widths (W_1 and W_2) and the area of cross-section. **(10 marks)**

Question Two (20 marks)

a) The co-ordinates of corners of a polygonal area of ground were taken as A(200,100), B(300, 200), C(182.02, 268.55), D(148.80, 292.93), E(87.50, 191.74) in terms of N and E returning to A. Calculate the area enclosed to the nearest hectares. If the chain, nominally 20m long used on the survey was later found to be 0.2m short, what will be the actual area of the polygon. **(10 marks)**

b) Tabulate the data required to set out, using a chain and a tape, a circular curve of radius 600m to connect two straights deflecting through an angle of 19°24'. The chainage of the intersection (I) tangents was 2200m (Use a chord of 20m). **(10 marks)**

Question Three (20 marks)

a) A cutting is to be made in ground which has a traverse slope of 1 in 5. The width of formation is 8.00m and the side slopes are 1 vertical to 2.5 horizontal. If the depths at the centre-lines of three cross-sections 25m apart are 4.50m, 5.10m and 6.30m respectively, determine the volume of earth involved in this length of cutting. **(12 marks)**

b) Determine the area from the following data:

Chainage (m)	0	20	40	60	80	100	120	14	160	180
Offset (m)	0	6.45	10.64	9.38	11.94	14.86	10.12	5.01	2.79	0

(8 marks)

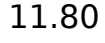
Question Four (20 marks)

a) The area within the underwater contours are as follows:

Contour	460	465	470	475	480	485	490
Area (m^2)	3100	8700	10600	20500	24000	15000	5000

Calculate the volume of water in the lake between 460m and 490 using End Area and Prismoidal methods. **(4 marks)**

b) The figure below shows the existing ground levels on 15m square grid forming part of a site which is to be excavated to uniform formation level of 10m above datum. Compute the volume of Earth to be excavated assuming vertical sites.



Calculate the volume of Earth to be excavated assuming vertical sides. **(12 marks)**

c) Define the following terms as used in Mass Haul Diagram (MHD)

i) Mass Haul Diagram
ii) Bulking
iii) Shrinkage
iv) Haul **(4 marks)**

Question Five (20 marks)

a) With an aid of a sketch, derive the elements of curves. **(8 marks)**

b) Tabulate the data required to set out by theodolite and chain, a circular curve of radius 600m to connect two straights having a deflection angle of 18^{o} 24', the chainage of intersection point was given as 2140m. **(12 marks)**