TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR BACHELOR OF SCIENCE IN CIVIL ENGINEERING (BCE 11A/12J)

ECE 2306: ENGINEERING SURVEYING III

END OF SEMESTER EXAMINATION
SERIES: APRIL 2013
TIME ALLOWED: 2 HOURS

Instructions to Candidates:
You should have the following for this examination
- *Answer Booklet*

This paper consists of **FIVE** questions.
Answer any **THREE** questions
Maximum marks for each part of a question are as shown
This paper consists of **THREE** printed pages

Question One

a) A road of two straight sections has to be connected by a circular curve which meets them tangentially at a point. With a detailed illustration show how it will happen defining all related points at angles. **(10 marks)**

b) Differentiate between the following:
(i) Bulking and shrinkage
(ii) Borrow and waist **(4 marks)**

c) With a detailed illustration, draw a balancing procedure of a mass-haul diagram and briefly it. **(6 marks)**

d) A plan for an excavation for a building shown below has reduced levels in the four corners. The excavation which has vertical sides is to be taken down to a uniform reduced level of 50m. Calculate the volume of earth to be removed. Assume the slope of the group to be constant.

Given depth at
C= 2.5m, D = 3m
E = 2m and F = 1m

Question Two

a) A grid of reduced levels taken on existing ground at the proposed site for buildings is shown below. The formation level for the excavation is to be at a reduced level of 5m. Calculate the volume of earth to be excavated by considering the site divided up into a grid of nine rectangles as shown.

(10 marks)

Figure 2

b) A circular curve is to be set out by the method of offsets from chords produced using steel tapes only. The radius is 150m and the chords 10m.

(i) Make the necessary calculations for setting out the curve

(ii) Explain in detail how the curve is set out on the ground. **(10 marks)**

Question Three

a) Define the term mass-haul diagram and hence briefly explain the uses of mass-haul diagram.

(10 marks)

b) The figure below shows a plan of a survey. The readings were as follows:

Distance (m)	0	20	40	60	80	100	120	140	160
Ordinates (m)	18	21	24	26	23	18	20	19	0

Calculate the area of the plot using Simpson's rule

x

Where x = 20m

Question Four

a) Briefly explain the methods used to find areas enclosed by boundaries having irregular curves. **(10 marks)**

b) A road cutting has a formation width of 10m and the sides are 2 to 2. The ground surface is horizontal. Find the volume of the excavation between two cross-sections 150m apart. Vertical depths at the end cross-sections are 3m and 5m respectively. **(10 marks)**

Question Five

A road construction section has been extracted and a mass-haul diagram prepared as follows: The free haul distance is specified as 200m.

c d'

The earth moving changes are as follows:

(i) Cost of free haul volume = ksh 300 per m^3
(ii) Cost of overhaul volume = ksh 450per m^3
(iii) Cost of borrowing = ksh 250 per m^3

Calculate the cost of each of the following alternatives:

a) Borrow at chainage 1000m only
b) Borrow at chainage 0m only
c) Borrow at chainage 300m only