THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)
Faculty of Engineering and Technology

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

BRIDGING TO HIGHER DIPLOMA

EBC 2413: ENGINEERING SURVEYING III

END OF SEMESTER EXAMINATION

SERIES: DECEMBER 2011

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*
- *Scientific calculator*

This paper consists of **FIVE** questions in two sections **A** & **B**
Answer question **ONE (COMPULSORY)** and any other **TWO** questions.
Maximum marks for each part of a question are clearly shown
This paper consists of **FIVE** printed pages

SECTION A (COMPULSORY)

Question 1

a) State **FOUR** points a surveyor must take into account when selecting traverse stations (4 marks)

b) Name any **THREE** methods by which angular measurements between traverse legs can be made. (3 marks)

c) A loop traverse was run around a site ABC as shown in figure 1. Given the information as shown, determine:
   i) The corrected bearings of the traverse lines AB and BC.
   ii) The total coordinates of points B and C given the coordinates of point A as (-1000.00m latitudes, +1000.00m departure) (10 marks)

152.908m

d) Explain the following methods as applied to mass-haul diagrams
   (i) Balancing line
   (ii) Maximum and minimum points of a mass-haul diagram
   (iii) Total cut volume (3 marks)

Figure 2 below shows simple circular curves joined by two straights T1 and T2I.

FIGURE 2

Derive the mathematical expressions for determining

i) Distance T_1I
ii) Distance T_1 T_2
iii) Distance IB (6 marks)

SECTION B (Answer any TWO questions from this section)

Question 2

Table 1 below shows tacheometric observations taken at point P with instrument height being 1.55m. the tacheometric constants were 100 and zero respectively and distance RS was measured as 144.92m. Assuming that the ground was level within triangle PRS and the reduced level of point P was 1000m above datum, calculate the volume of filling required to make the area level with the highest point (20 marks)

STATION	POINT	STAFF READINGS (M)			VERTICAL
		BOTTOM	MID	TOP	ANGLES
P	R	1.790	3.040	4.290	+10°20’
	S	2.390	3.130	3.870	-80°11’

TABLE 1

Question 3

a) Define the following terms as applied to civil engineering works;
   i) Datum
   ii) Horizontal control
   iii) Invert levels
   iv) Formation levels (4 marks)
b) The following data relates to a simple circular curve:

   Radius 250m
   Deflection angle 50°35’
   Chainage of point of intersection 3 + 045

Using the information above, compute and tabulate all setting out data on a through and through chainage basis using chord lengths of 20m by deflection angle method (16 marks)

Question 4

a) Table 2 below is an extract of chain survey field not booked for purposes of determining the area of a site. Compute area ABCDEFGA (8 marks)

	STN. E	
	150.0	
	127.7	36.50(D)
(F) 46.20	104.0	
	83.50	37.30 (C)
(G) 48.40	51.70	
	25.00	28.00 (B)
	0 STN. A	

TABLE 2

b) Given that the coordinates of points ABCDEF and G were taken later by GPS device and tabulated as in table 3 below, determine the same area by coordinates hence determine the GPS error assuming chaining was perfect (12 marks)

POINT	NORTHINGS (M)	EASTINGS (M)
A	31.816	-123.521
B	59.816	-98.521
C	69.155	-40.021
D	68.316	4.179
E	31.816	26.480
F	-14.384	-19.521
G	-16.584	-71.821

TABLE 3

Question 5

A sewer line is to be set out at a uniform falling gradient of 1:100 from points x_1 to x_4. Man holes are to be constructed at x_1 x_2 x_3 and x_4. The distances between the points were measured as follows:

$x_1 - x_3$ 43m

$x_2 - x_3$ 52m

$x_3 - x_4$ 68m

The invert level of x_2 was established as 104.23m, and a 3m traveler is used for setting out. Determine the following given the data in table 4 below as picked on the ground before trenching was done;

a) Ground reduced levels for x_1 to x_4 by the height of collimation method.
b) Invert levels for points x_1 to x_4.
c) Staff reading necessary for setting out sight rails at points x_1 x_2 x_3 and x_4.
d) Dept of digging at each manhole position (20 marks)

BACK SIGHT	INTER SIGHT	FORE SIGHT	DISTANCES (M)	REMARKS
1.370				TBM CORNER BUILDING
	2.525		0	X_1
	2.413		43	X_2 r. level (106.50m)
	2.005		52	X_3
		3.004	68	X_4

TABLE 4