# THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

**(A Constituent College of Jkuat)**

***Faculty of Engineering and Technology***

**DEPARTMENT OF BUILDING AND CIVIL ENGINEERING**

DIPLOMA IN CIVIL ENGINEERING
DIPLOMA IN ARCHITECTURE
DIPLOMA IN BUILDING & CIVIL ENGINEERING

## EBC 2213: ENGINEERING SURVEYING III

END OF SEMESTER EXAMINATION

**SERIES: AUGUST/SEPTEMBER 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
Answer question **ONE** and any other **TWO** questions
Maximum marks for each part of a question are as shown
This paper consists of **FOUR** printed pages

**SECTION A (COMPULSORY)**

**Question 1**

a) Define the following terms.

(i) Mass-haul diagram
(ii) Waste
(iii) Station metre
(iv) Open traverse
(v) Closed traverse
(vi) Overhaul (6 marks)

b) Derive expressions for the following elements of a circular curve

(i) Tangent length
(ii) Long chord
(iii) Major offset
(iv) Curve length (10 marks)

c) A simple circular curve 14m radius is to be set out to connect two straights deflecting at an angle of 86°. Given that the curve is to be set out by the method of offsets from the long chord, calculate the data for setting out the curve if the offsets are to be at 2.5m intervals (14 marks)

**SECTION B (Answer *any TWO questions from this section*)**

**Question 2**

The information shown in table 1 refers to the traverse shown in fig.1. Given the whole circle bearing of line $T_1 - T_2$ as 51° 01' 35'' and the total co-ordinates of point T1 as 1000.00ME, 2000.00MN. Calculate the total co-ordinates of points $T_2$ and $T_3$ adjusting for any misclosure by the Bowditch's rule. (20 marks)

Table 1

| Line | Length | Uncorrected clockwise | Internal | Angle |
|---|---|---|---|---|
| | | 0 | ' | ' ' |
| T1 – T2 | 115.15 | 79° | 43 | 04 |
| T2 – T3 | 236.50 | 71 | 39 | 10 |
| T3 – T1 | 228.18 | 28 | 37 | 40 |

*Fig 1.0*

T1

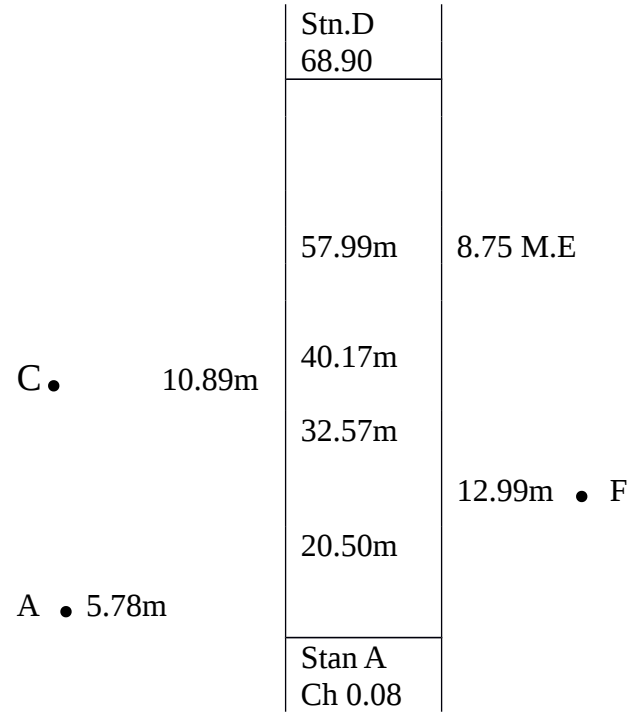
**Question 3**

A circular curve 404.00m radius is to be set out to connect two straight deflecting at an angle of 27°. The chainage of the intersection point is 7059.53m and the curve is to be set out by the theoddite and tape method for continuous chainage using 20m standard chords. Calculate the data for setting out the curve. (20 marks)

**Question 4**

a) The data shown in table 2 is for a chainage survey of a plot. Calculate the area of the plot (9 marks)

Table 2.0




b) Fig 2 shows the cross-section of an embankment. Calculate the following for the embankment.

(i) The side widths W1 and W2
(ii) The cross-sectional area (11 marks)

Fig 2.0




**Question 5**

A sewer line is to run through points A B C and D, such that AB = 40.00m, BC = 60.00m and CD = 50.00m. In order to set out the sewer a level was set up nearby and a series of levels run through the ground point ABC and D as recorded in table 3. The sewer is to run at a falling gradient of 1:100 from A to D. Given the invert reduced level of manhole. A as 54.40 and that a 3.0m traveler is available, calculate:

(a) The ground reduced levels by the height of collimation method (4 marks)

(b) The invert reduced levels of manholes B, C and D (3 marks)

(c) The staff readings necessary for setting out sight rails at manhole position A B C and D. (5 marks)

(d) The height of the manholes above the ground surface (4 marks)

(e) The depths of dig at each manhole positions (4 marks)

**Table 3**

| **BS** | **IS** | **FS** | **Distance** | **Remarks** |
|---|---|---|---|---|
| 1.378 | | | | TBM RL = 56.62m |
| | 2.578 | | 0.00 | Point A |
| | 2.410 | | 40.00 | B |
| | 2.881 | | 100.00 | C |
| | | 2.950 | 150.00 | D |