# THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A CONSTITUENT COLLEGE OF JKUAT)

## *Faculty of Technology*

# DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

DIPLOMA IN CIVIL ENGINEERING

DIPLOMA IN ARCHITECTURE

DIPLOMA IN BUILDING AND CIVIL ENGINEERING

## EBC 2213: ENGINEERING SURVEYING III

SPECIAL/SUPPLEMENTARY EXAMINATION

**SERIES:** OCTOBER 2011

**TIME:** 2 HOURS

**INSTRUCTIONS:**

You should have the following for this examination
- *Answer booklet*
- *Question paper*
- *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

**QUESTION ONE** (COMPULSORY)

(a)  (i)  Define the following terms as used in mass-haul diagrams:

- Waste
- Average haul distance
- Over-haul volume
- Free-haul distance.

(ii)  The data shown in table 1 was obtained in a chain survey of a field.  Calculate the area of the field by the Simpson's method.

**TABLE 1**

| Chainage (m) | 0 | 20 | 40 | 60 | 80 | 100 | 120 | 160 | 160 |
|---|---|---|---|---|---|---|---|---|---|
| Offset (m) | 0 | 15.2 | 17.5 | 19.7 | 14.8 | 16.0 | 15.5 | 10.5 | 2.5 |

**(10 marks)**

(b)  The data shown in table 2 refers to the ground reduced levels at the intersection of a rectangular grid of a plot.  A basement with vertical sides is to be excavated on the plot, given the sides of the grid as 15.0m x 20.0m.  Given the formation reduced level as 110.0m, calculate the volume of excavation.  **(10 marks)**

**TABLE 2**

| Grid reference | A | B | C |
|---|---|---|---|
| 1 | 120.7 | 122.5 | 123.7 |
| 2 | 121.8 | 123.9 | 124.0 |
| 3 | 123.8 | 124.2 | 124.2 |

(c)    Referring to figure 1 name and derive formulae for the following elements of the circular curve:

- T I – I
- T I – T2
- H – I                                                                                        **(10 marks)**

**QUESTION TWO**

A circular curve, 250.00m radius, is to be set out to connect two straights deflecting at an angle of 58°. Give the chainage of the intersection point as 715.00m and that the curve is to be set out by the continues chainage basis (through and through chainage), calculate the tangential angles for setting out the curve for 20 m standards chords .                                                                **(20 marks)**

**QUESTION THREE**

Table 4 shows the length and the uncorrected partial co-ordinates of a link traverse P, 1, 2,3, Q.  Given the co-ordinates of points P and Q as:
P: 1050.00ME;  1270.00mN
Q: 1975.24ME;  1652.48mN
Calculate the co-ordinates of points 1, 2 and 3, adjusting for any misclosure by the transit rule
                                                                                               **(20 marks)**

**Table 3**

| Line | Uncorrected partial co-ordinates (m) | | Length (m) |
|---|---|---|---|
| | EASTINGS | NORTINGS | |

| PI | +205.847 | -105.199 | 231.17 |
| 12 | +21.560 | +370.225 | 426.41 |
| 23 | 315.705 | -272.800 | 417.24 |
| 3Q | +192.114 | +390.226 | 434.98 |

**QUESTION FOUR**

(a)    Determine the area enclosed by a line of a closed traverse survey ABCDE from the data shown in table 3                                                                                      **(8 marks)**

**Table 3**

| Station | Easting (m) | Northings (m) |
|---|---|---|
| A | 300.00 | 412.78 |
| B | 206.98 | 567.84 |
| C | 468.55 | 245.12 |
| D | 392.93 | 324.98 |

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| | | |
|---|---|---|
| **E** | 291.74 | 198.45 |

(b) Describe the following techniques of overcoming obstacles in setting and of circular curves.

   (i)     The whole curve cannot be set out from the same point.
   (ii)    An obstacle intervenes on the curve.                                    **(12 marks)**

**QUESTION FIVE**

An existing sewer at A is to be extended to B and C on a falling gradient of 1: 110 and on plan
 distances of 60.00m and 90.00m consecutively.

The following observations were obtained from a leveling exercise for controlling excavation:

   Level reading of staff on TBM on wall of RL 870.085M=1.390m
   Level reading of staff on top of peg at A = 1.160m
   Level reading of staff on top of peg at B =2.35m
   Level reading of staff of invert of existing sewer at A = 2.840m.

Given that a 2.0m traveler is available, calculate:
   (i)     The invert reduced levels at A, B and C
   (ii)    Reduced levels of top of sight rails at A, B and C.
   (iii)   The staff reading necessary for fixing the tops of the sight rails at at A, B and C
   (iv)    The height of the sight rails at A and B.
   (v)     The depths of excavation at the manhole positions.           **(20 marks)**