THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)

(A Centre of Excellence)

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

HIGHER DIPLOMA IN BUILDING & CIVIL ENGINEERING (HDBC 12S)

EBC 3107: THEORY OF STRUCTURES II

SPECIAL/SUPPLEMENTARY EXAMINATION
SERIES: FEBRUARY 2013
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 any **THREE** questions
Maximum marks for each part of a question are as shown
This paper consists of **THREE** printed pages

Question One

Using McCauley's method, determine in terms of EI, the deflection at point C and D in beam loaded as shown in figure 1. **(20 marks)**

Figure 1

Question Two

a) For the beam shown in figure 2, sketch the influence line diagram for:
   (i) The reactions at A
   (ii) The reaction at B
   (iii) The bending moment at E **(12 ½ marks)**

b) Determine the maximum bending moment at point E in 2(a) when a uniformly distributed load of 50KN/m and 6m long crosses the beam from C to D. **(7 ½ marks)**

Figure 2

Question Three

a) State the first and second Mohr's theorems and give their mathematical expressions. **(4 marks)**

b) Figure 3 shows a simple beam supported at points A and B and acted on by two moving point loads 1.0m apart.
   (i) Sketch the influence lines diagrams for R_A, R_B shear force and bending moment at point E on the beam.
   (ii) Determine the maximum shear force and bending moment at point E on the beam.
   (16 marks)

E

Question Four

(a) Figure 4 shows the cross-section of a cast iron beam. The beam is 7m long and simply supported at point 2m and 5.5m from the left-hand end. Determine the maximum value of uniformly distributed load (inclusive of self weight) the beam can carry. The fibres stresses are not to exceed $15N/mm^2$ in tension and $30N/mm^2$ in compression. **(17 marks)**

b) Determine the maximum uniformly distributed load the beam in 4(a) above would carry if the flanges were reversed so that the 25mm flange is at the bottom. **(3 marks)**

100mm

Question Five

a) A simply supported beam has a span of 20m. A uniformly distributed load of 2KN/m and 5 metres long crosses the span. Find the maximum BM produced at a point 8m from the left support. **(20 marks)**