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

END OF SEMESTER EXAMINATION
SERIES: DECEMBER 2012
TIME: 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 **FOUR** printed pages

Question One

a) For the beam shown in figure 1. Sketch the influence line diagram for;
- **(i)** The reaction 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 1(a) when a uniformly distributed load of 50KN/m and 6m long crosses the beam from C to D **(7 ½ marks)**

10m

Question Two

Using influence lines, determine the maximum bending moment at a point 20m from the left hand support of the girder shown in figure 2 when the loads move from A to B. **(20 marks)**

30KN

Question Three

Using Macaulay's method, determine the position and magnitude of the maximum deflection for the beam loaded as shown in figure 3 given E as 200KN/m^2 and I as 160 x 10^6 mm^4. **(20 marks)**

C

Question Four

(a) (i) State Mohr's theorem for slope and deflection.

(ii) Using the theorem, derive the expressions for maximum slope and deflection for a simply supported beam of span ℓ carrying a uniformly distributed load w KN/m along its entire span. **(7 marks)**

b) Figure 4 shows a cantilever beam of uniform section. Assuming E = 210KN/mm^2, Use Macaulay's method to determine the maximum slope and deflection on the beam. **(13 marks)**

B

Question Five

a) A uniformly distributed live load of 5KN/m run of length 10m moves on a girder of span 25m. Find the max positive and negative shear force at a section 10m from the left and also max bending moment. **(7 marks)**

10m

b) A beam of constant cross-section and made of the same material throughout is loaded as shown in figure 7 below. By conjugated beam method, determine the deflection at the centre and at point D. **(13 marks)**

r

20KN