TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

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

EBC 3108: THEORY OF STRUCTURES II

END OF SEMESTER EXAMINATION
SERIES: APRIL 2014
TIME ALLOWED: 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 of the **FIVE** questions
All questions carry equal marks

Maximum marks for each part of a question are as shown
This paper consists of **THREE** printed pages

Question One

a) Sketch influence line diagram for:

- **(i)** Reaction A
- **(ii)** Reaction B
- **(iii)** Bending moment at E **(12 marks)**

b) Determine maximum bending moment at E in 1(a) when a uniformly distributed load of 50KN/m and 6.0m long crosses the beam from C to D. (Figure 1) **(8 marks)**

D

Question Two

Using influence lines, determine the maximum bending moment at point 20.0m from the left hand support of the girder in figure 2 as the load moves from A to B. **(20 marks)**

10m 6m 6m 8m

Question Three

Using Macaulay's' method, determine position and magnitude of the maximum deflection of the beam loaded in figure 3.

Data:

$E_{steel} = 200KN/mm^2$

$I_{xx} = 160 \times 10mm^4$ **(20 marks)**

30KN

Question Four

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

(ii) Derive expressions for slope and deflection for a uniformly supported load along the entire span. Use Mohr's theorems. **(7 marks)**

b) Use Macaulay's method to determine the maximum slope and deflection on the beam in figure 4. **(13 marks)**

Figure 4(b)

Question Five

a) Determine the maximum positive and negative shear forces at a section 10.0m from the left end maximum bending moment as the load moves across the span (figure 5) **(7 marks)**

Figure 5

b) A beam of constant EI is loaded as shown in figure 6. Using conjugate beam method, determine the deflection at the middle end at point D. **(13 marks)**

1.0m