TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

DIPLOMA IN BUILDING & CIVIL ENGINEERING (DBCE 13J)

EBC 2207: 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*
- *Scientific Calculator*
- *Mathematical Tables*

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

b) Figure 1 show a simple beam supported at points A and B and acted on b two moving loads 1.0 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 moments at point E of the beam.

(16 marks)

R_B

Question Two

a) A simply supported beam whose, cross section is shown in figure 2 is subjected to a maximum bending moment of 52.9KNm. Taking E = 205KN/mm2; determine:
- (i) The radius of curvature
- (ii) The maximum tensile and compressive stresses **(10 marks)**

Figure 2

b) If the permissible stresses in compression and tension for the cross-section in figure 2 above were 45.5N/mm^2 and 25.5N/mm^2 respectively, calculate:
- **(i)** The safe bending moment for the section
- **(ii)** The safe uniform load which the beam can carry on a span of 6.8m if one end is free and the other fixed. **(10 marks)**

Question Three

a) For the beam shown in figure 3(a), sketch the influence lines for reactions 'A' and 'B'.

b) If a train of loads as shown in figure (3b) is at the position indicated relative to beam in figure (3a), determine the magnitudes of the reaction 'R_A' and 'R_B' **(20 marks)**

2m

Question Four

a) For the beam shown in figure 4, sketch the influence lines diagrams for:
- **(i)** The reaction at A
- **(ii)** The reaction at B
- **(iii)** The bending moment at E **(6 marks)**

b) Determine the maximum bending moment at point E in (4a) when a uniformly distributed load of 70KN/m and 6m long crosses the beam from C to D **(14 marks)**

2m

Question Five

The load system shown in figure 5 crosses abeam simply supported over a span 24m.

Figure 5

Determine the maximum bending moment under 25KN load **(20 marks)**