



TECHNICAL UNIVERSITY OF MOMBASA
**Faculty of Engineering &
Technology**

DEPARTMENT OF BUILDING & CIVIL ENGINEERING
DIPLOMA IN BUILDING & CIVIL ENGINEERING (DBCE 12M)
DIPLOMA IN ARCHITECTURE (DA 12M)

EBC 2207: THEORY OF STRUCTURES II

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: OCTOBER 2013

TIME ALLOWED: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*
- *Mathematical tables/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

- a) A simply supported beam whose cross-section is shown in figure 1 is subjected to a maximum bending moment of 52.8kNm. Taking $E = 205\text{KN/mm}^2$. Determine:

Figure 1

Determine:

- (i) The maximum tensile and compressive stresses
 - (ii) The radius of curvature **(14 ½ marks)**
- b) If the permissible stresses in compression and tension for the cross-section in figure 1 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. **(5 ½ marks)**

Question Two

- a) For the beam shown in figure 2, sketch the influence line diagrams 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 Q1(a) when a uniformly distributed load of 50kN/m and 6m long crosses the beam from C to D **(7 ½ marks)**

10m

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 points 1.0 apart.

- (i) Sketch the influence unit diagrams for R_A , R_B , shear force and bending moment at point E on its beam.
- (ii) Determine the maximum shear force and bending moment at point E on the beam.

D

Question Four

Using Macaulay's method, determine in terms of EI , the deflection at point C and D in the beam loaded as shown in figure 4 **(20 marks)**

E

Question Five

Using influence lines, determine the maximum bending moment at a point 20m from the left hand support of the girder shown in figure 5 when the loads move from A to B **(20 marks)**

B