THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)

(A Centre of Excellence)

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

DIPLOMA IN BUILDING & CIVIL ENGINEERING (DBC 011)
DIPLOMA IN CIVIL ENGINEERING (DC 011)

EBC 2211: STRENGTH OF MATERIALS II

SPECIAL/SUPPLEMENTARY EXAMINATION
SERIES: OCTOBER 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 **THREE** printed pages

Question One (20 Marks)

a) With the aid of a sketch, show that the maximum shearing stress occurring in a rectangular section is $\frac{1.5Q}{bd}$ equal to (5 marks)

b) Figure 1 shows a cross-section of a masonry dam retaining water against its vertical face.
   i) Investigate the stability of the dam with respect to tension in the joints.
   ii) Calculate the ground bearing pressure at "A" and "B" and the coefficient of friction. Take density of masonry as 2300kg/m^3. (15 marks)

Figure 1

Question Two (20 Marks)

a) List any **THREE** failure criteria of gravity dams. (3 marks)

b) A masonry dam of trapezoidal section has a top width of 2m, bottom width of 4.0m and a height of 10.0m. It retains 8.0m deep water on vertical side. Determine the maximum and minimum pressures at the base.
   Take: Weight of masonry = 2000KN/m^3
   Weight of water = 1000KN/m^3 (17 marks)

Question Three (20 Marks)

a) Figure 2 below shows a flitched beam consisting of two timber joists 200mm x 75mm and a steel plate 150mm x 10mm securely bolted between them. The beam is simply supported on a span of six metres and carries a UDL (Uniformly distributed load of 900N/m. Calculate the maximum tensile and compressive stresses in both materials due to their load.

   Esteel = 210KN/mm^2
   Etimber = 8.75KN/mm^2

Question Four (20 Marks)

Figure 3 below represents the cross-section of an extruded allow member which acts a simply supported beam with the 60mm wide flange at the bottom. Determine the moments of resistance of the section. If the maximum permissible stresses in tension and compression are respectively 60 and 45MN/m^2

(20 marks)

Question Five (20 Marks)

Calculate the maximum horizontal shear in the beam shown in figure 4 below, if it is subjected to a vertical shear force of 150KN. Sketch the shear stress variation diagram for the section. **(20 marks)**

40mm