THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)

Faculty of Engineering and Technology

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

DIPLOMA IN CIVIL & COMPUTER AIDED DESIGN (DBC 10B)
DIPLOMA IN CIVIL ENGINEERING (DC 10B)
DIPLOMA IN ARCHITECTURE (DA 10B)

EBC 2201: STRENGTH OF MATERIALS II

END OF SEMESTER EXAMINATION

SERIES: DECEMBER 2011

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer booklet*

This paper consists of **FIVE** questions
Answer question **ONE (COMPULSORY)** from **SECTION A** and any other **TWO** questions from **SECTION B**
Maximum marks for each part of a question are clearly shown
This paper consists of **THREE** printed pages

SECTION A (COMPULSORY)

Question 1

Figure 1(a) and (b) shows details of a loaded beam and its cross-section.

a) Calculate the maximum bending stress in the beam.
b) The moment of resistance of the beam at a bending stress of 165N/mm^2.
c) The radius of curvature at the maximum bending moment
d) The section modular
e) Maximum and minimum radii of syration. Given E = 205kn/MM^2 (30 marks)

Fig.1 (a) 6mm

SECTION B (Answer *any TWO questions from this section*)

Question 2

Calculate the maximum horizontal shear in the beam shown in figure 2. If it is subjected to vertical shear force 150KN. Sketch the shear variation diagram for the section.

80mm

Question 3

a) With the aid of a sketch, show that the maximum shearing stress occurring in a rectangular section is equal to $\max = \frac{1.5Q}{bd}$ (5½ marks)

b) Figure 3 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^2 (14½ marks)

Figure 3

Question 4

Figure 4 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 inclusive uniformly distributed load of 900N/m. Calculate the max. tensile and compressive stresses in both materials due to this load. Esteel= 210KN/mm^2, Etimber = 8.75KN/m^2 (20 marks)

Fig. 4

Question 5

A granty brick wall 6m high has a vertical back and retains a soil of bulk unit weight of 17.65KN/m^3 and angle of shearing resistance of 30°. If the wall is of unit weight 19.62KN/m^3 and is 1.2m wide at the top, determine the width of the wall at the base if no tension is to occur (20 marks)