THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)
Faculty of Engineering and Technology

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

DIPLOMA IN CIVIL ENGINEERING (DC 011)

DIPLOMA IN BUILDING & CIVIL ENGINEERING (DBC 011)

EBC 2201: STRENGTH OF MATERIALS I

SPECIAL/SUPPLEMENTARY 2012

SERIES: MAY/JUNE 2012

TIME: 2 HOURS

Instructions to Candidates:
You should have the following for this examination
- *Answer Booklet*
- *Calculator*

This paper consists of **FIVE** questions
Answer question any **THREE** questions
Maximum marks for each part of a question are clearly shown
This paper consists of **THREE** printed pages

Question 1 (20 marks)

a) Illustrate the variations of stress with strain for a mild steel rod subjected t an increasing tension force from zero to failure (6 marks)
b) Define the following terms:

   i) Proof stress
   ii) Elastic limit
   iii) Poisson ratio (6 marks)

c) A steel bar rectangular cross-section 150 x 60 mm is subjected to an axial tension of 250KN. Determine the changes that result in the cross-sectional dimensions. Given that $E = 200KN/mm^2$, and poisons ratio = 0.4

Question 2 (20 marks)

A beam is loaded as shown in figure 4.
   a) Calculate the support reactions.
   b) Draw the shear force and bending moment diagrams indicating the values at the critical points. (20 marks)

B

Question 3 (20 marks)

a) Figure 2 shows the cross-section of built up beam made of steel and a plate. Determine:
   i) The position of the centroid along x-x axis
   ii) The second moment of area about xx axis (20 marks)

Figure 1

Question 4 (20 marks)

a) State **FIVE** assumptions made in the analysis of pin jointed plane frames.

b) Using the resolution of joints method. Determine the nature of magnitude of the force for the members of the frame shown in figure 3   (20 marks)

Figure 3

Question 5 (20 marks)

Draw SFD and BMD for the figure 4: and then determine the point of contraflexure: (20 marks)

A