THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of Jkuat)

Faculty of Engineering and Technology

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

DIPLOMA IN BUILDING & CIVIL ENGINEERING
DIPLOMA IN CIVIL ENGINEERING
DIPLOMA IN ARCHITECTURE

EBC 2201 : STRENGTH OF MATERIALS I

END OF SEMESTER EXAMINATION

SERIES: AUGUST/SEPTEMBER 2011

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer booklet*
- *Scientific Calculator*

This paper consists of **FIVE** questions in TWO sections A & B
Answer question **ONE (COMPULSORY) in section A** and any other **TWO** questions from section B
Maximum marks for each part of a question are as shown
This paper consists of **FOUR** printed pages

SECTION A (COMPULSORY)

Question 1

a) Sketch the shear force and bending moment diagrams indicating the critical values for the beam loaded as shown in fig 1 (10 marks)

Fig 1

b) Determine the positions of the points of contra flexure for the fig 1 of 1(a) (20 marks)

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

Question 2

a) (i) Define the following terms:

(i) Poisson's ratio
(ii) Modulus of rigidity
(iii) Working stress

(ii) Determine a fully labeled typical strain-strain graph for a mild steel rod tested to destruction (7 marks)

b) Determine the following properties of the sectional shape shown in fig 2 (13 marks)

(i) Centre of area
(ii) Ixx
(iii) Iyy
(iv) $\bar{y}$ bottom

Fig 2

Question 3

Determine the magnitude of the forces in the members of the frame shown in fig 3 and the nature of the forces in each member using the tension co-efficient method. (20 marks)

Fig 3

Question 4

a) Fig 4 shows the cross-section of built up beam made of plates. Determine;
   (i) The position of the centroid along xx axis

   (ii) The second moment of area about xx axis (20 marks)

Fig 4

Question 5

a) Find the position of the centroid of the triangular area shown in fig 5 related to the y axis (10 marks)

d

b) Determine both the compressive stress in the shaft and the bearing stress in the base of the column shown in fig 6 due to an axial load of 10MN. (10 marks)

Fig 6