



# 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 10A)**  
**DIPLOMA IN BUILDING & CIVIL ENGINEERING (DBC 10A)**

EBC 2301: THEORY OF STRUCTURES III

**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 (30 marks)**

A Portal frame ABCD shown in figure 1 is loaded with a uniformly distributed load of 2,000kg/m on the horizontal member. The moment of inertia of member AB = that of CD = I and that of member BC = 3I.

Fig. 1

Find the support reactions and bending moment in the frame by moment distribution method and draw the bending moment diagram (make 5 distributed) (30 marks)

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

**Question 2**

A continuous beam ABCDE, with uniform flexural rigidity throughout, has roller supports at B,C and D, a built in support at E and an over-lanq AB as shown in figure 2.

8t

It carries a uniformly distributed load of intensity of  $2t/m$  on AB and another of intensity of  $3t/m$  over BCDE. In addition to it, a point load 8tonnes is placed mid-way between C and D. The span lengths are  $AB = 1m$ ,  $BC = CD = DE = 5m$ . Obtain the support moments by the moment distribution method and sketch BMD giving values at salent points (20 marks)

### Question 3

Using the three moment theorem, analyze the beam shown in figure 3 and hence sketch the shearing force and bending moment diagrams indicating the values at all critical points (20 marks)

C

### Question 4

Using the three moment theorem, evaluate the bending moment and shear force diagrams of the beam shown in figure 4. (20 marks)

6m

### Question 5

A continuous beam ABC of uniform section, with span AB as 8m and BC as 6m is fixed at A and simply supported at B and C. The beam carrying a uniformly distributed load of  $1KN/m$  throughout its length. Find the moments along the beam and the reactions at the supports. Also draw the BMD. (20 marks)

F