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 (DBC 09A)

DIPLOMA IN CIVIL ENGINEERING & COMPUTER AIDED DESIGN (DCC 09A)

EBC 2317: STRUCTURAL STEEL AND TIMBER DESIGN

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: FEBRUARY/MARCH 2012

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*

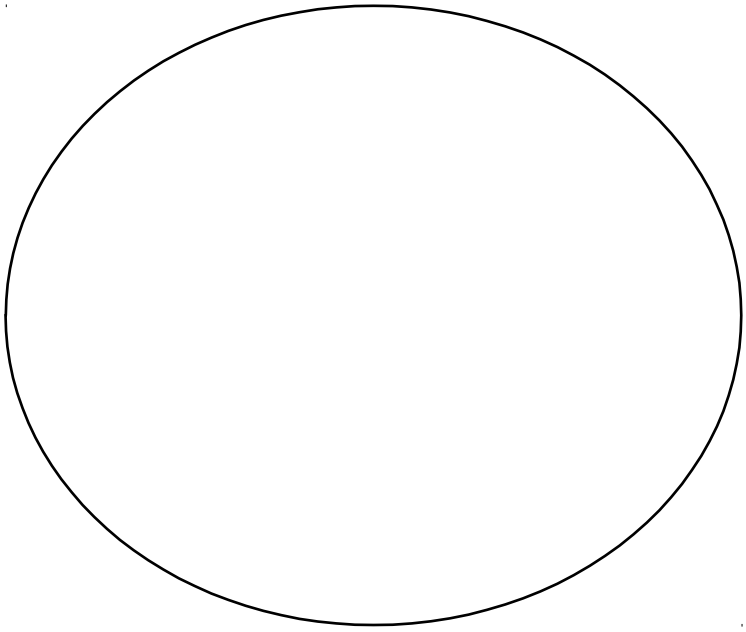
This paper consists of **FIVE** questions in two sections **A** & **B**
Answer question **ONE (COMPULSORY)** and any other **TWO** questions.
Maximum marks for each part of a question are clearly shown
This paper consists of **THREE** printed pages

SECTION A (COMPULSORY)

Question 1

Figure 1 shows a universal beam carrying a uniformly distributed load of 25KN/m

a) Select a suitable U.B section to satisfy bending requirements (10 marks)
b) Carry out checks for:
    i) Shear
    ii) Deflection between points A and B
    iii) Web buckling at point B (10 marks)



SECTION B (Answer any TWO questions from this section)

Question 2

Figure 2 shows a stanchion and an incoming beam of span 4.5m carrying a uniformly distributed load of 10KN/m over the entire span. In addition the column carries an axial load of 250KN from upper floors. The actual length of the column is 4.5m and is fully fixed at both ends. Select a suitable stanchion section and check its adequacy. (20 marks)

Fig 2

Question 3

a) State advantages of structural steel over reinforced concrete (6 marks)

b) A Grade 43 U.B section spars 5.0m and is supported of 15mm thick angle cleats onto a u.c. The beam carries a uniformly distributed load of 120KN over its entire span. Select a suitable section and carry out checks for:
   (i) Shear
   (ii) Deflection
   (iii) Web buckling (14 marks)

   Take $E_s = 210\ KN/mm^2$

Question 4

a) Define the following as applied to stanchions
   (i) Actual length
   (ii) Effective length
   (iii) Slenderness ratio (6 marks)

b) An axially loaded stanchion of actual length 4.0m is required to carry a load of 500KN. The column is fully fixed at top and bottom.
   Select a suitable u.c. section and check its adequacy (14 marks)

Question 5

Design stanchion base for the stanchion in question 4(b).

Take:
$P_{cc} = 5.3\ N/mm^2$
$P_{bct} = 185N/mm^2$ (20 marks)