THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

((A Constituent College of JKUAT)

(A Centre of Excellence)

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

DIPLOMA IN ARCHITECTURE (10A)

DIPLOMA IN CIVIL ENGINEERING (10 A)

EBC 2317: STRUCTURAL STEEL & TIMBER DESIGN

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: OCTOBER 2012

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*

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)

Figure 1 shows a universal beam carrying a uniformly distributed load of 30KN/m.

a) Select a suitable Grade 43 U.B section for 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)**

30KN/m

Figure 1

Question 2 (20 marks)

a) Define the following as applicable 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 450KN. The column is fully fixed at top and bottom select a suitable Grade 43 u.c. section and checks its adequacy. **(14 marks)**

Question 3 (20 marks)

A stanchion is required to transmit 600KN to its square base. The stanchion is 4.5m height and fully fixed at bottom but pinned at top.

a) Select a suitable u.c. section. **(12 marks)**
b) Design square base for the stanchion. **(8 marks)**

Data:

Pcc = 5.3N/mm^2
Pbct = 185N/mm^2

Question 4 (20 marks)

a) State advantages of structural steel over reinforced concrete. **(6 marks)**
b) A grade 43 U.B section of span 5.0m is supported on U.C.sections by 15mm thick angle cleats at both ends. The beam carries a total uniformly distributed load of 150KN over its entire span. Select a suitable section for bending requirements and carry out checks for:
   (i) Shear
   (ii) Deflection
   Esteel = 210KN/mm^2 **(14 marks)**

Question 5 (20 marks)

Figure 2 shows a stanchion and an in-coming beam of 4.0m span carrying a uniformly distributed load of 12KN/m. The column carries an axial load of 250KN from upper floors. The floor to floor height is 4.0m and the column is fully fixed at top and bottom. Select a suitable Grade 43 U.C. section and check its adequacy. (**20 marks)**