



**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 check 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:

$$\begin{aligned} P_{cc} &= 5.3\text{N/mm}^2 \\ P_{bct} &= 185\text{N/mm}^2 \end{aligned}$$

**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  
E<sub>steel</sub> = 210KN/mm<sup>2</sup> **(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)**

