



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)
Faculty of Engineering and Technology

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

DIPLOMA IN ARCHITECTURE (10A)

DIPLOMA IN CIVIL ENGINEERING (10 A)

EBC 2317: STRUCTURAL STEEL & TIMBER DESIGN

END OF SEMESTER EXAMINATION

SERIES: APRIL 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 20kN/m.

- a) Select a suitable U.B section for bending requirements (8 marks)
- b) Carry out checks for:
- (i) Shear
 - (ii) Deflection between points A and B
 - (iii) Web buckling at point B
 - (iv) Bearing at point B (12 marks)

u.c

Figure 1

Question 2 (20 marks)

Figure 2 shows a stanchion and an incoming beam of span 4.5m carrying a uniformly distributed load of 12kN/m over its entire span. In addition the column carries an axial load of 400kN from upper floors. The actual length of the stanchion is 4.0m is fully fixed at top and bottom. Select a suitable *u.c.* Section and check its adequacy. (20 marks)

u. c

Question 3 (20 marks)

- a) State advantages of structural steel over reinforced concrete (6 marks)
- b) A grade 43 *U.B* section of effective span 5.0m is supported on to *u.c* columns by 15mm thick angle cleats at both ends.

It carries a total uniformly distributed load of 10kN over its entire span. Select a suitable section and carry out checks for:

- (i) Shear
(ii) Deflection
(iii) Web buckling (14 marks)

Take $E_s = 210\text{kN/mm}^2$

Question 4 (20 marks)

- 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 to support a load of 500kN. The column is fully fixed at bottom but pinned at top. Select a suitable *u.c.* section and check its adequacy (14 marks)

Question 5 (20 marks)

Design stanchion base for *u.c* in question 4(b). Take $P_{cc} = 5.3\text{N/mm}^2$, $P_{bet} = 185\text{N/mm}^2$ (20 marks)