



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

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 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 30KN/m

- a) Select a suitable U.B section to satisfy bending requirements (12 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 (18 marks)

Fig 1

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

SECTION B (Answer any TWO questions from this section)

Question 2

Figure 2 shows a stanchion and an incoming beam of span 5.0m carrying a uniformly distributed load of 10KN/m over the entire span. In addition the column carries an axial load of 300KN from upper floors. The actual length of the column is 4.0m 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 6.0m and is supported of 15mm thick angle cleats carries a total uniformly distributed load of 150KN 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

- 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 4.5m is required to carry a load of 600KN. 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

A stanchion is required to transmit an axial load of 500k to a square pad. The stanchion is 4.0m actual height and fully fixed at bottom but pinned at top.

- a) Select a suitable u.c section and check its adequacy (15 marks)
- b) Design stanchion base. Take $f_c = 5.3\text{N/mm}^2$; $P_{bct} = 185\text{N/mm}^2$