



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of Jkuat)

Faculty of Engineering and Technology

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

DIPLOMA IN CIVIL ENGINEERING (DC 10)

DIPLOMA IN ARCHITECTURE (DA 10)

HIGHER DIPLOMA IN BUILDING & CIVIL ENGINEERING (HDBC 10)

EBC 2316/EBC 3217 : STRUCTURAL STEEL & TIMBER DESIGN

END OF SEMESTER EXAMINATION

SERIES: AUGUST/SEPTEMBER 2011

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer booklet*

This paper consists of **FIVE** questions

Answer question **ONE** and any other **TWO** questions

Maximum marks for each part of a question are as shown

This paper consists of **THREE** printed pages

SECTION A (COMPULSORY)

Question 1

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

- a) Select a suitable circle 43 U.B. Section assuming the compression plage is partially restrained against movement (12 marks)
- b) Check the:
- (i) Shear
 - (ii) Web buckling at point B
 - (iii) Web crushing at point B
 - (iv) Deflection between points A and B assuming simple supports (18 marks)

Fig 1.0

A

SECTION B (Answer any *TWO* questions from this section)

Question 2

Fig 2 shows a stanchion and an incoming beam of span 4.0 carrying a uniformly distributed load of 10KN/m. In addition, the column carries an axial load of 300KN from upper floors. The floor to floor height is 4.0m and the column is fully fixed at both ends.

Select a suitable Grade 43 u.c. section and check its adequacy

300KN

Question 3

- a) State advantages of structural steel over reinforced concrete (6 marks)
- b) A grade 43 U.B section spans 6.0m and is supported onto u.c. sections by 15mm thick angle cleats at both ends. The beam carries a total load of 120KN over its entire span. Select a suitable section and carry out checks for:
- (i) Shear
 - (ii) Deflection
 - (iii) Web buckling

Taken $E_s = 210KN/mm^2$

U.B partially restrained against movement (20 marks)

Question 4

- a) Define the following as applied the 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 a load of 500KN. The column is fully fixed at bottom but partially restrained at top. Select a suitable Grade 43 u.c. section and check its adequacy. (14 marks)

Question 5

An uncased stanchion is required to transmit an axial load of 700KN to its square base. The stanchion is 3.6m height and fully fixed at the bottom while pinned at top (15 marks)

- a) Select a suitable Grade 43 u.c. section and check its adequacy (6 marks)
- b) Design stanchion base:
Take $P_{e} = 5.3N/mm^2$

$$P_{bet} = 185N/mm^2c$$