



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)

(A Centre of Excellence)

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

HIGHER DIPLOMA IN BUILDING & CIVIL ENGINEERING (HDBC 11)

EBC 3217: STRUCTURAL STEEL & TIMBER DESIGN

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: FEBRUARY 2013

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 (COMPULSORY)** and any other **TWO** questions

Maximum marks for each part of a question are as shown

This paper consists of **THREE** printed pages

Question One (Compulsory)

- a) State advantages of structural steel over reinforced concrete. **(6 marks)**
- b) A Grade 43 U.B section of spar 5.9m is supported on to 15mm thick angle cleats at both ends. The beam support total uniformly distributed load of 120KN over its entire span. Select a U.B. Section for bending requirements:

Carry out the following checks:

- (i) Shear
(ii) Deflection **(14 marks)**

Take: $E_{steel} = 210\text{KN/mm}^2$

Question Two

A u.c stanchions is to transmit on axial load of 500KN to a square base. The actual length is 4.5m and is fully fixed at top and bottom.

- a) Select a suitable grade 43 U.C section and check its adequacy. **(12 marks)**
b) Design a base. **(8 marks)**

Date: $P_{cc} = 5.3\text{N/mm}$
 $P_{bct} = 185\text{N/mm}^2$

Question Three

- a) Figure 1 shows a U.C. stanchion on in-coming of span 4.5m carrying a total uniformly distributed load of 30KN/m over the entire span. In addition the column supports an axial load of 150KN from upper floors. The actual length of the column is 3.8m and is fully fixed at top and bottom.

Select a suitable Grade 43 U.C. Section and check its adequacy. **(20 marks)**

4.5m U.B carrying 30KN/m

Question Four

a) Define the following as applied to stanchions:

- (i) Actual length
- (ii) Effective length
- (iii) Slenderness ratio

(6 marks)

b) A axially loaded stanchion of actual length 4.5m is required to support a load of 400KN. The column is fully fixed at bottom but pinned at top. Select a suitable Grade 43 U.C section and check its adequacy.

(14 marks)

Question Five

Figure 2 shows a U.B. Section supporting a uniformly distributed load of 25KN/m.

a) Select a suitable Grade 43 U.B section and check its adequacy.

(10 marks)

b) Carry out checks on:

- (i) Shear
- (ii) Deflection between A and B
- (iii) Web buckling at B.

(10 marks)