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

EBC 2317: STRUCTURAL STEEL & TIMBER DESIGN

SPECIAL/SUPPLEMENTARY EXAMINATON

SERIES: OCTOBER 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 (COMPULSORY)** 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

Fig. 1 shows a universal beam carrying a uniformly distribution load of 25KN/m.

a) Select a suitable Grade 43 u.b section to satisfy bending requirements (12 marks)
b) Check for;
    i) Shear
    ii) Web backling at support B
    iii) Web crushing at support B
    iv) Deflection between support A and B assuming simple supports (18 marks)

Fig.1

Take Es = 210KN/mm^2

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

Question 2

Fig. 2 shows a stanchion and an incoming beam of spar 5.0m carrying a uniformly distributed load of 12KN/m. In addition, the column carries an axial load of 400KN 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. (20 marks)

Fig. 2

Question 3

a) State advantages of structural steel over reinforced concrete

b) A circle 43 U.B section spans 6.0m and is supported on to 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 shear, deflection and web buckling (20 marks)

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 lod of 500KN. The column is fully fixed at bottom but pinned at top. Select a suitable circle 4.3 u.c section and check its adequacy (14 marks)

Question 5

A circle 43 u.c section is required to transmit an axial load of 600KN on to its square base. The stanchion is 4.0 actual heights and is fully fixed at both ends.

a) Select a suitable circle 43 u.c section and check its adequacy (15 marks)
b) Design stanchion base (5 marks)

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