TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

DIPLOMA IN BUILDING & CIVIL ENGINEERING (DBCE 13S & 14J)

EBC 2202: THEORY OF STRUCTURES I

END OF SEMESTER EXAMINATION
SERIES: DECEMBER 2014
TIME ALLOWED: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*

This paper consists of **FIVE** questions. Answer any **THREE** questions of the **FIVE** questions
All questions carry equal marks
Maximum marks for each part of a question are as shown
Use neat, large and well labeled diagrams where required.

This paper consists of **THREE** printed pages

Question One

a) State the assumptions in Euler Theory of Struts and state its limitations as that Rankine's theory. **(6 marks)**

b) Illustrate diagrammatically Euler load for different and conditions for struts. **(6 marks)**

c) An I-section in figure 1 is used as a strut. Both ends are fixed. Determine the Euler crippling load. $E_{steel} = 210KN/mm^2$ **(8 marks)**

20mm

Question Two

A hollow tube with external and internal diameters 35mm and 25mm respectively extends 6.4mm under a tensile load of 200KN. The actual length of the strut is 4.0m. The strut is fully fixed at bottom but pinned at top. Determine the Euler buckling load. **(20 marks)**

Question Three

An I-section in figure 2 is used as a strut. Both ends are fully fixed. Determine the Euler crippling load if the strut is subjected to axial and eccentric loading. Determine the stresses at points A, B, C and D.

D = 222.3mm

$Ixx = 9462cm^4$

$Iyy = 311.9cm^4$

$A = 110.1cm^2$

B = 208.8mm **(20 marks)**

x

Question Four

A T-section in figure 3 is used as a strut. The actual length is 4.5m and both ends are pinned. Determine the Euler crippling load. **(20 marks)**

Question Five

Determine the Euler crippling load for a cylindrical section of 40mm and 20mm external and internal diameters respectively. The actual length is 5.0m and the strut is fully fixed at both ends. Esteel = 210KN/mm^2 **(20 marks)**