TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

DIPLOMA IN BUILDING & CIVIL ENGINEERING (DBCE 12M)
DIPLOMA IN ARCHITECTURE (DA 13M)

EBC 2202: THEORY OF STRUCURES I

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

Instructions to Candidates:

You should have the following for this examination

- *Answer booklet*
- *Drawing Paper*
- *Drawing Instruments*

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
This paper consists of **THREE** printed pages

Question One

A T-section 150mm x 120mm x 20mm is used to strut of 4m long with hinged at its both ends calculate the crippling load, if Young's modulus for the material be 200Gpa. **(20 marks)**

Question Two

Figure 1 show a column of rectangular section loaded in a number of different ways. Calculate the combined direct and bending stress in the extreme fibres at each corners of the section. **(20 marks)**

80mm 300mm 30mm 120mm

Question Three

A simply supported steel beam is subject to the combined application of an axial tension and a lateral load as shown in figure 2. The beam consists of a joist section having the following properties.

Depth = 152mm, area = 2180mm^2, second moment of area 8.81 x $10^6 mm^4$

Calculate the maximum compressive and tensile stresses acting in the beam. **(20 marks)**

160KN

Question Four

Using Macaulay's method, determine the position and magnitude of the maximum deflection for the beam loaded as shown in figure 3. Give E = 250KN/m^2 and I = 170 x 106mm^4. **(20 marks)**

Figure 3

Question Five

Find the Euler's crippling load for a hollow cylindrical steel column of 38mm external diameter and 2.5mm thick. Take length of column as 2.3m and hinged at its both ends. Take $E = 2.05 \times 10^3 KN/mm^2$.

Also determine the crippling load by Rankine's formula, using constant as $3.35 KN/mm^2$ and 1/7500.

(20 marks)