TECHNICAL UNIVESITY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

CERTIFICATE IN BUILDING & CIVIL ENGINEERING
(CBCE 12M)

EBC 1103 : DEFORMATION AND BENDING MOMENTS

END OF SEMESTER EXAMINATION
SERIES: OCTOBER 2013
TIME: 2 HOURS

Instructions to Candidates:
You should have the following for this examination

- *Answer booklet*
- *Pocket calculator*

This paper consists of **FIVE** questions in **TWO** sections **A** & **B**

Answer question **ONE (COMPULSORY)** and any other **TWO** sections from section **B**
Maximum marks for each part of a question is as shown
This paper consists of **THREE** printed pages

SECTION A (COMPULSORY)

Question One

a) Sketch typical stress strain curve of a mild steel indicating all the critical points **(8 marks)**

b) Define the following terms
   (i) Hooke's Law
   (ii) Limit of proportionality
   (iii) Elastic limit
   (iv) Yield point
   (v) Maximum stress **(12 marks)**

c) From the first principles of composite bars, show that the stress of a material (δ_1) is given by

$$6_1 = PE_1 / \left(A_1E_1 + A_2E_2 \right)$$

(10 marks)

SECTION B (*Attempt any TWO questions***)**

Question Two

A uniform beam weighing 500KN is held in a horizontal position by three vertical wires as shown in figure 1. The outer wires are 1.25 mm diameter brass and the centre one is 0.625mm diameter steel.

$$E_b = 85KN/mm^2$$

Estimate the stresses and loads induced in the wires given that

$$E_s = 200KN/mm^2$$

(20 marks)

Fig 1.0

1.25 brass

Question Three

Construct the shear force and bending moment diagrams for the beam shown in fig 2.0 **(20 marks)**

8KN

Fig 2.0

Question 4

a) Define the following
   (i) Reaction
   (ii) Shear force
   (iii) Bending moment **(6 marks)**

b) For the beam shown in fig 3, construct the shear force and bending moment diagrams. Determine moments shear force at 0.6m from free end. **(14 marks)**

300N

Fig 3.0

Question 5

a) Determine the second moment of area of the section in fig 4 about x-x axis **(18 marks)**

b) Also determine the radius of gyration for the fig 4 **(2 marks)**

50 mm

Fig 4