TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

DIPLOMA IN BUILDING & CIVIL ENGINEERING (DBCE 12M)

EBC 2208: STRENGTH OF MATERIALS II

SPECIAL/SUPPLMENTARY EXAMINATION
SERIES: OCTOBER 2013
TIME ALLOWED: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*
- *Mathematical tables/Calculator*

This paper consists of **FIVE** questions.
Answer any **THREE** questions
Maximum marks for each part of a question are as shown
This paper consists of **FOUR** printed pages

Question One

a) State the FOUR basic requirements is determining the stability of retaining walls.

b) Figure 1 shows a vertical cross-section of a mass concrete wall which retains soil against its vertical face up to the top of the wall. Calculate the intensity of bearing pressure beneath the toe P and the heel Q

Figure 1

c) A cantilever wooden beam 1.4m effective span is 160mm wide and 300mm deep. The beam carries the following loads.

(i) A concentrated load of 8KN at the centre.
(ii) A uniformly distributed load of 400KN/m for the whole span
(iii) The self weight of the beam may be assumed to be 6KN/m^3.

If the permissible working stress is 6N/mm^2, find the additional concentrated load, the cantilever could carry its free end. (20 marks)

Question Two

A simply supported beam the cross-section of which is shown in figure 2 is subjected to a maximum bending moment of 40KNm. Take E = 210KN/mm^2.

180mm

Determine:

(i) The position of centroid of the section with reference to point “P”
(ii) The second moment of area of the beam section
(iii) The maximum tensile and compressive stresses produced
(iv) The radius of curvature

Question Three

a) Show that for a rectangular beam of breadth ‘b’ and depth ‘d’, the maximum shear stress is equal to 1.5 times the average shear.

b) Plot the shear stress distribution diagram for the beam section in figure 3, at all critical points. Take shear force of 120KN and second moment of area as $140.1 \times 10^6 mm^4$

200mm

Question Four

a) Using the integration method, obtain expressions for the slope and deflection at the free and of a cantilever of effective span L, carrying a concentrated load "W" at its free end.

b) Figure 4(a) shows a universal beam AB which is used as a cantilever. It carries a uniformly distributed load of W KN/m for the entire length. If the horizontal shearing stress at the centre of the cantilever at a point 150mm below the surface of the top flange is $20N/mm^2$, calculate the value of W (neglect the self weight of universal beam).

Figure 4(a)

Question Five

Figure 5 below represents the cross-section of an extruded alloy member which acts as a simply supported beam with the 0mm wide flange at the bottom. Determine the moments of resistance of the section if the maximum permissible stresses in tension and compression are respectively 60 and $45MN/m^2$

Figure 5