TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

DIPLOMA IN BUILDING & CIVIL ENGINEERING (DBCE 13J)

EBC 2208: STRENGTH OF MATERIALS II

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 **FOUR** printed pages

Question One

a) Derive the equation of theory of simple bending. **(10 marks)**

b) Determine the maximum moment which can be resisted by the section in figure 4 if the maximum possible stresses are 100N/mm^2 and 120N/mm^2 for top and bottom fibres respectively.
(10 marks)

160mm

Question Two

Determine the pressures as the base of the concrete dam in figure 2.

(i) When the reservoir in full
(ii) When the reservoirs is empty

The density of the concrete is 2400kg/m^3 **(20 marks)**

Figure 2

Question Three

Calculate the distribution of horizontal shear stress across the section in figure 3. The applied force is 900KN. **(20 marks)**

400m

Question Four

A simply supported beam the cross-section of which is show in figure 4 is subjected to a maximum bending moment of 40KNM. Take E = 210KN/mm^2, determine:

20mm

(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) Radius of curvature **(20 marks)**

Question Five

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. **(5 marks)**

b) Plot the shear stress distribution diagram for the beam section shown in figure 5 at all critical points. Take shear force of 120KN and second moment of area as $40.1 \times 10^6 mm^4$ **(15 marks)**

Fig. 5