THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)

Faculty of Engineering and Technology

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

DIPLOMA IN ARCHITECTURE (DA 10B)

EBC 2201: STRENGTH OF MATERIALS II

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: FEBRUARY/MARCH 2012

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer booklet*

This paper consists of **FIVE** questions
Answer question **ONE (COMPULSORY)** from **SECTION A** and any other **TWO** questions from **SECTION B**
Maximum marks for each part of a question are clearly shown
This paper consists of **THREE** printed pages

SECTION A (COMPULSORY)

Question 1

With the aid of a sketch, show that the maximum shearing stress occurring in a rectangular section is

$$\max = \frac{1.5Q}{bd}$$

equal to (5 marks)

Figure 1 shows a cross-section of a masonry dam, retaining water against its vertical face.

(i) Investigate the stability of the dam with respect to tension in the joints

(ii) Calculate the ground bearing pressure at "A" and "B" and the coefficient of friction. Take density of masonry as 2300kg/m^3. (15 marks)

Figure 1

SECTION B (Answer *any TWO questions from this section*)

Question 2

a) List any **THREE** failure criteria in a gravity dams (3 marks)

b) A masonry dam of trapezoidal section has a top width of 2m, bottom width of 4m and height of 10m. It retains 8m deep water on vertical side. Determine the maximum and minimum pressure at the base. Take: Weight of masonry = 200KN/m^3
Weight of water = 1000KN/m^3 (17 marks)

Question 3

Figure 2 below shows a flitched beam consisting of two timber joists 200mm x 75mm and a steel plate 150mm x 10mm securely bolted between them. The beam is simply supported on a span of six metres and caries an udl of 900N/m. Calculate the maximum tensile and compressive stress in bolts materials due to this load.

Esteel = 210KN/m^2, Etimber = 8.75KN/mm^2

Fig. 2

Question 4

Figure 3 below represents the cross-section of an extruded alloy member which acts as a simply supported beam with the 60mm wide and large at the bottom. Determine the moments of resistance of the section, if the maximum permissible stress in tension and compression are respectively 60 and 45MN/m^2

Figure 3

Question 5

Calculate the maximum horizontal shear in the beam shown in figure 4 below. If it is subjected to a vertical shear force of 150KN. Sketch the shear stress variation diagram for the section.

80mm