TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

DIPLOMA IN BUILDING AND CIVIL ENGINEERING

EBC 2208: STRENGTH OF MATERIALS II

END OF SEMESTER EXAMINATION

SERIES: APRIL 2016

TIME: 2 HOURS

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination

- Answer booklet
- Scientific calculator

This paper consists of **FIVE** questions
Answer any other **THREE** questions
Use neat, large and well labelled diagrams where required
Maximum marks for each part of a question are as shown
This paper consists of **THREE** printed papers.

QUESTION ONE

a) State the assumptions in the theory of simple bending. **(5 marks)**

b) Derive the formula of bending stresses given in the form $\frac{f}{y} = \frac{E}{R} = \frac{m}{I}$ with usual notations**.** **(15 marks)**

QUESTION TWO

a) State the major assumptions made in Rankine earth's pressure theory. (**5 marks)**

b) Show that the maximum shear stress in a rectangular section equals to1.5times the average shear stress. (**5 marks)**

c) A beam of length 1.3M and cross sectional dimensions 150mm wide by 250mm deep is simply supported and carries a point load W at mid-span. The permissible stresses are 7N/mm^2 in bending and 1N/mm^2 in shearing. Calculate the safe load that the beam can carry. **(10 marks)**

QUESTION THREE

a) Define a composite beam and state the circumstances that may necessitate its use**(5 marks)**

b) A timber beam of cross sectional dimensions 125mm wide by 250 mm deep is to be strengthened by a steel plate 125mm wide by 15mm deep at the top and by another plate of 125mm wide by 8mm deep at the bottom. Given that the stress in steel is 140N/mm^2. Determine the moment of resistance of the strengthened section**. (15 marks)**

QUESTION FOUR

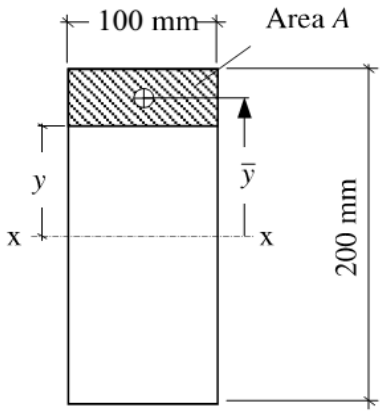
a) Define the term shear stress distribution. (**2 marks)**

b) Sketch the shear stress distribution of the following shapes

   i. I section

   ii. rectangular section (**4 marks)**

c) A rectangular beam 100mm wide by 200mm deep is subjected to a vertical shear force of 5000N. Determine the shear stress distribution at points y=75mm, y=50, y=25 and y=0. Thus plot the shear distribution curve. (**14 marks)**



QUESTION FIVE

The figure below shows a retaining wall of density 2500 Kg/M^3 which supports a cohesionless soil of density 1900 Kg/M^3 and angle of shearing resistance of 28^0.

Examine the stability conditions of the wall with regards to

i. Tension in joints
ii. Ground bearing pressure
iii. Factor of safety against overturning **(20marks)**