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

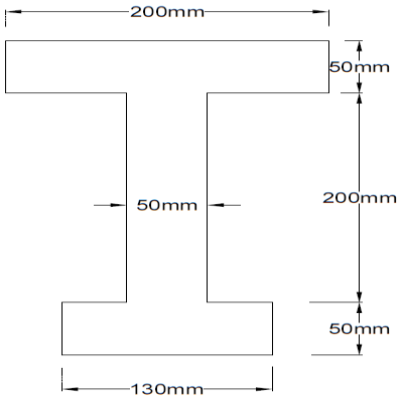
This paper consists of **FIVE** questions
Answer any other **THREE** questions
Use neat, large and well labelled diagrams where required
Maximum marks for each part of a question are as shown
This paper consists of **FOUR** printed papers.

ECE 2208: STRENGTH OF MATERIALS II

QUESTION ONE

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

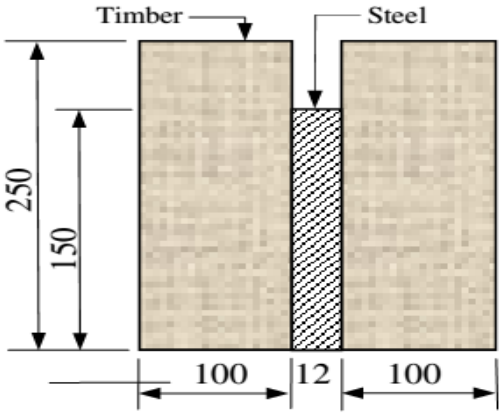
b) An I-section with unequal flanges of thickness 50mm as shown below is used as a simply supported beam over a span of 7 meters. The beam carries a uniformly distributed load of 5KN/M and a point load of 20KN at mid span. Determine the maximum tensile and compressive stresses. **(15marks)**



QUESTION TWO

a) A composite beam consists of a timber and two steel plates rigidly fixed to the top and bottom. Derive the formula for the total moment of resistance. **(6 marks)**

b) A composite beam consisting of a 12mm thick steel plate sandwiched between two timber joints. The composite beam is subjected to a bending moment of 6.25KNM. Determine the maximum tensile and compressive stresses developed in steel and timber. Take E_T=10KN/MM^2 AND E_S=210KN/MM^2 **(14 marks)**

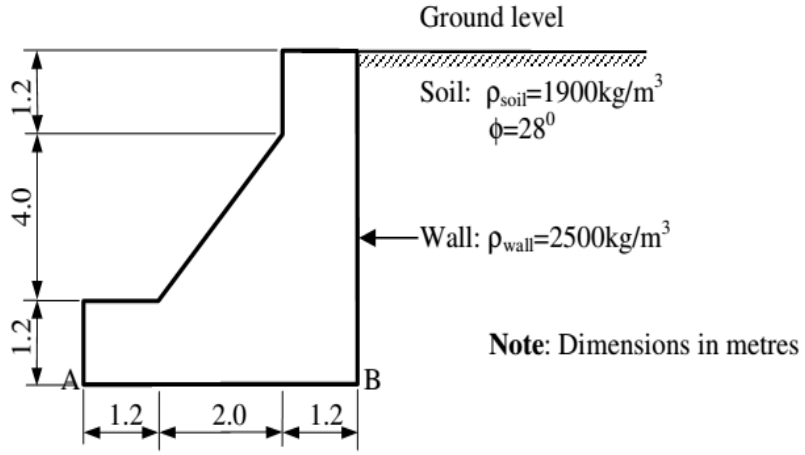


QUESTION THREE

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.

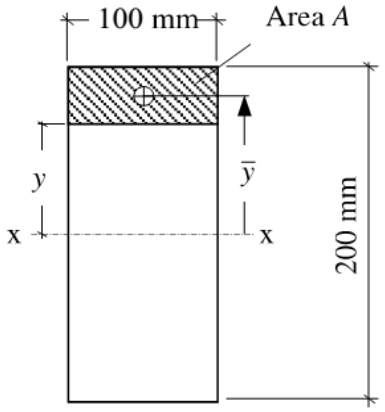
Examine the stability conditions of the wall with regards to

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



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

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)**