TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF BUILDING & CIVIL ENGINEERING
INSTITUTIONAL BASED PROGRAMME
UNIVERSITY EXAMINATION FOR:
- DIPLOMA IN BUILDING AND CIVIL ENGINEERING

EBC 2208: STRENGTH OF MATERIALS II
END OF SEMESTER EXAMINATION
SERIES: JULY 2017
TIME: 2 HOURS
DATE: ----JULY 2017

Instructions to Candidates

You should have the following for this examination
-Answer Booklet, examination pass and student ID
-Drawing instruments.
-Scientific calculator

This paper consists of **FIVE** questions.
Attempt **any THREE questions**.
Do not write on the question paper
Mobile Phones are NOT allowed inside the examination room

QUESTION ONE

a) A timber beam 100mm wide and 200mm deep is strengthened by a steel plate 100mm wide and 10mm thick, screwed at the bottom surface of the timber as shown in figure Q1A. Calculate the moment of resistance of the beam if the safe stress in timber and steel are $10N/mm^2$ and $150N/mm^2$ respectively. Take $E_s = E_t$

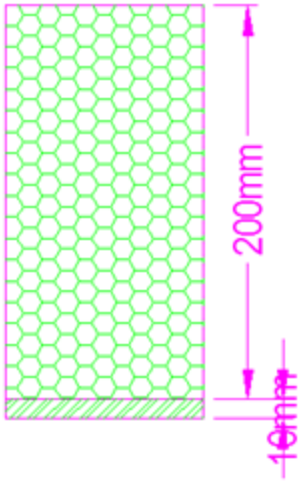

Fig.Q 1A

(10 marks)

b) A T- shaped cross section of a beam shown in figure Q1B is subjected to a vertical shear force of 10tonnes. Calculate the shear stress at the neutral axis and at the junction of the web and the flange. The moment of inertia about the horizontal neutral axis is 11340cm^4.

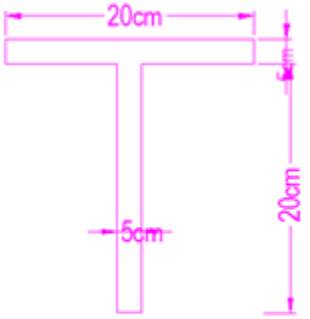

Fig.Q 1B

10 marks)

QUESTION TWO

A cast iron bracket subjected to bending has a cross section of I section with unequal flanges as shown in figure Q2 If the compressive stress in top flange is not to exceed 17.5N/mm^2, find:

i) the bending moment the section can take
ii) if the section is subjected to a shear force of 100kN draw the stress distribution over the depth of the section

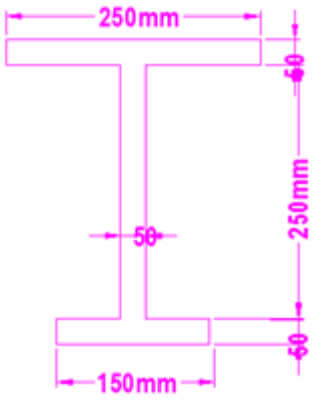

Fig.Q 2

(20 marks)

QUESTION THREE

The cross section of a beam shown in figure Q3 is made up of a material with permissible stress in compression and tension equal to 1000kg/cm^2 and 1400kg/cm^2 respectively.

i) Calculate the moment of resistance of the cross section when subjected to a moment causing compression at the top and tension at the bottom

ii) Calculate compression at the top flange ant tension in the bottom flange corresponding to this moment.

(20 marks)

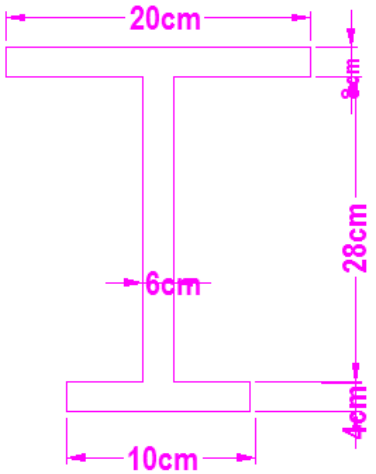

Fig. Q3

QUESTION FOUR

A masonry retaining wall of trapezoidal section with face on the earth side is 1.0m wide at the top, 3.0m wide at the bottom and 6.0m high as shown in figure Q4. It retains sand over the entire height with an angle of surcharge of 20°. Determine the distribution of pressure at the base of the wall. The sand weighs 1800kg/m^3 and has an angle of repose of 30°. The masonry weighs 2400kg/m^3

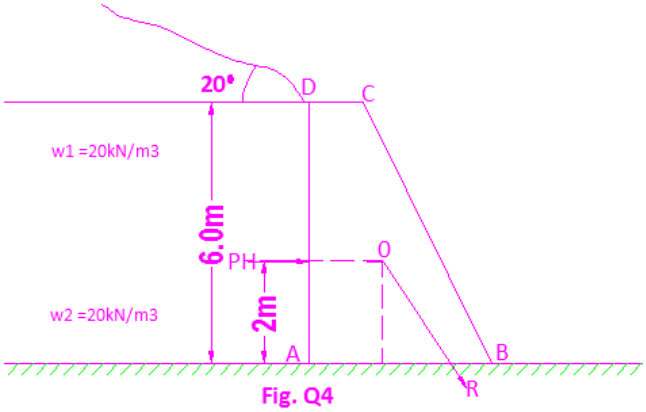

Fig. Q4

QUESTION FIVE

a) A square beam 20mm x 20mm in section and 2.0m long is supported at the ends. The beam fails when a point load of 400N is applied at the centre of the beam. Find the uniformly distributed load per metre lengthwhich will break a cantilever of gthe same mmaterial 40mm iwde and 60mm deep and 3.0m long

(14 marks)

b) List six assumptions made in the theory of simple bending

(6marks)