MACHAKOS UNIVERSITY

University Examinations 2016/2017

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

SECOND YEAR SECOND SEMESTER EXAMINATION FOR DIPLOMA IN CIVIL ENGINEERING

BCECD 212: STRENGTH OF MATERIALS II

DATE: 30/5/2017 **TIME: 2:00 – 4:00 PM**

INSTRUCTIONS:

- *This paper comprises of **five** questions*
- *Question **one** is **compulsory** and carry 30 marks*
- *Answer **question one** and any **other two** questions*

1. a) Explain four assumptions made in the theory of simple bending (10 marks)

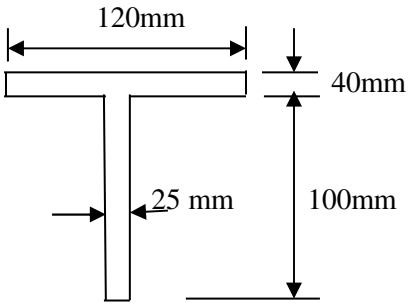
   b) A T-shaped steel section of dimensions 120mm x 140mm x 25mm carries load of 80kN and has a moment of inertia about is horizontal neutral axis is 3.142×10^6 mm^4. If the beam section is as shown in figure 1 below, calculate the shear stresses at;

   i The neutral axis

   ii The junction of the web and the flange

   iii Also plot the stress distribution diagram showing values at critical points

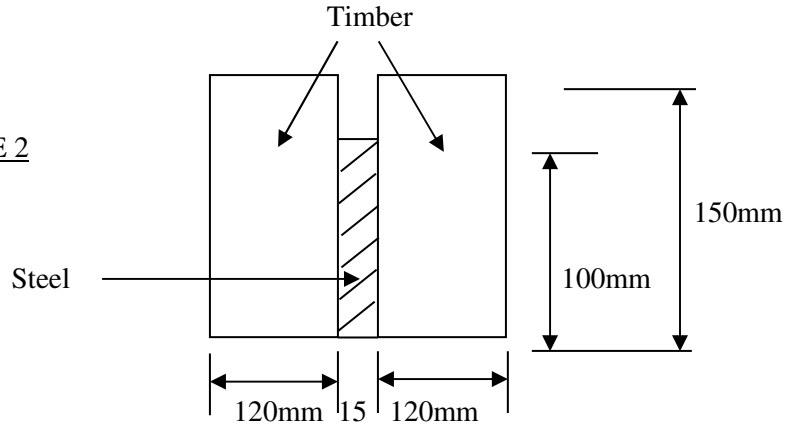
FIGURE 1



(20 marks)

2 A flitched beam is simply supported over a span of 5 m and carries a uniformly distributed load of 2 kN/m over the entire span. If the beam cross-section is as shown in figure 2 below, determine the maximum tensile and compressive stresses developed in both the materials due to the loading. (Take E_s = 210 kN/mm^2 and E_t = 10 kN/mm^2).

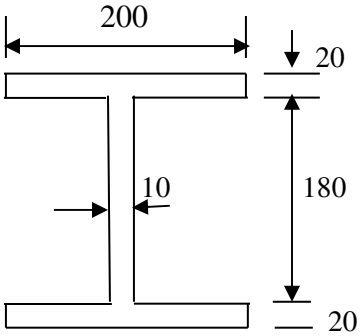
FIGURE 2



(20 marks)

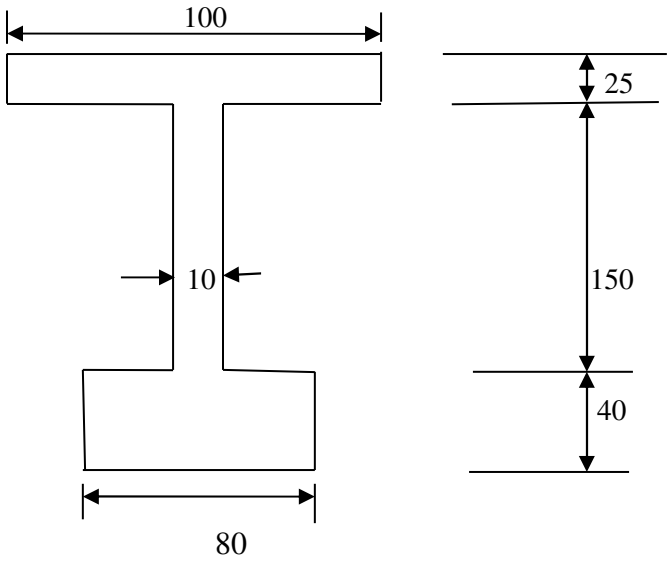
3. A rolled steel joist of I - section has dimensions as shown in figure 3 below and carries a uniformly distributed load of 40kN/m run on a span of 10m, calculate the maximum stress produced due to bending.

FIGURE 3



(20 marks)

4. a) Calculate the stresses, bending and shear for the beam shown below if the beam is simply supported 6m long and carries a uniformly distributed load of 40 kN/m over its entire span. Also sketch the shear stress variation diagram for the section. (14 marks)



b) Calculate the safe moment of resistance of the beam section shown in the figure in 4 (a) above if the stresses in the upper and lower flanges are limited to 25 N/mm^2 and 18 N/mm^2 respectively. (6 marks)

5 With an aid of a sketch, derive the formula for theory of simple bending. (20 marks)