UNIVERSITY OF ZAMBIA
SCHOOL OF ENGINEERING
DEPARTMENT OF MECHANICAL ENGINEERING

MEC 3351 – Strength of Materials I
Beam Stresses Assignment **Due: 19th April 2024**

Answer **ALL** questions but you will be advised on the due date which questions to respond to in class.

1. An I-beam has flanges 10cm wide and 1cm thick and web 12cm high and 1cm thick is shown Figure Q1. If this section is subjected to a bending moment of 1000kg.m and a shearing force of 1000kg, find the maximum tensile and shear stresses in it.

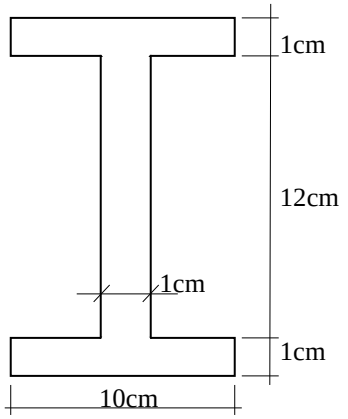

Figure Q1

2. An ornamental beam is in the form of a cross as shown in Figure Q2. This beam has a span of 4 m and carries a uniformly distributed load of 2000kg/m inclusive of its weight. Determine the maximum shear stress in the section and draw the shear stress distribution for the cross-section.

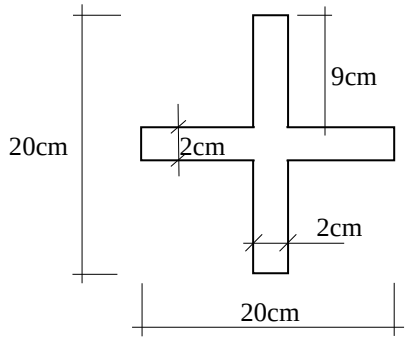

Figure Q2

3. A cantilever beam 2m long is fixes at one end and it is free at other end. It carries a uniformly distributed load of intensity 600kg per metre run. The cross-section of the beam is shown in Figure Q3. Calculate the stresses in the material due to bending.

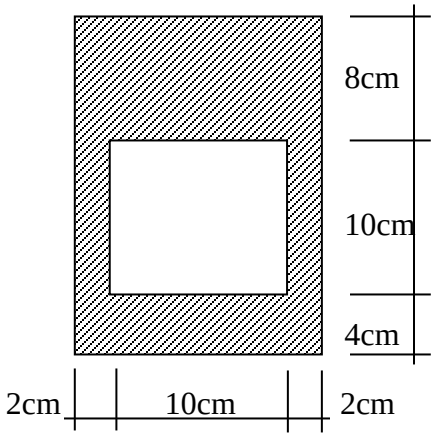

Figure Q3

4. A uniformly tapered cantilever of circular solid cross-section is fixed at one end and carries a concentrated load P at the free end as shown in Figure Q4. The diameter at the end is 20cm and increases uniformly to 40cm at the fixed end over a length of 2 metres.

   a) At what distance from the free end will the bending stresses in the cantilever be maximum?

   b) Calculate the value of the maximum bending stress if the concentrated load P= 2970kg.

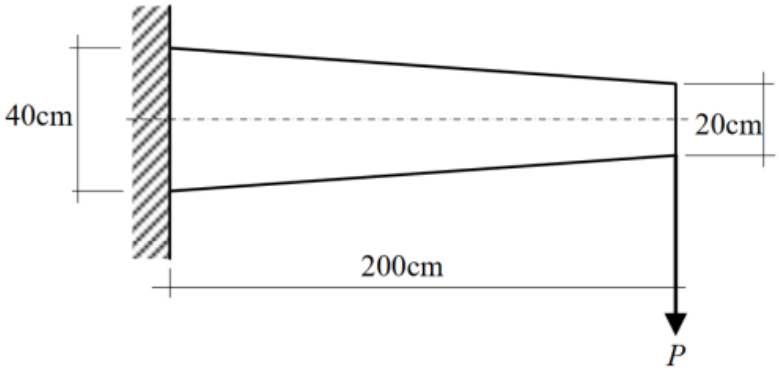

Figure Q4