



University of Brighton

CN133 STRUCTURAL AND STRESS ANALYSIS (SEMESTER 2, 2012-2013)

Mock TEST 3 – CALCULATION OF STRESS DISTRIBUTION

STUDENT NUMBER: _____

INSTRUCTIONS: Time allowed 2 hours
Answer all three questions
show ALL your work
Use pencil or pen to solve the test
If necessary use both sides of the paper

QUESTION 1 (30 marks)

Determine the centroid of the cross section depicted in Figure 1 (5 marks). Determine the normal stress distribution due to the bending moment $M=500 \text{ kNm}$ (15 marks) Draw the normal stress diagram (8 marks). Identify the critical points (2 marks) considering $H = 20 \text{ cm}$; $B = 15 \text{ cm}$; $a = 2 \text{ cm}$; $\beta = 30^\circ$

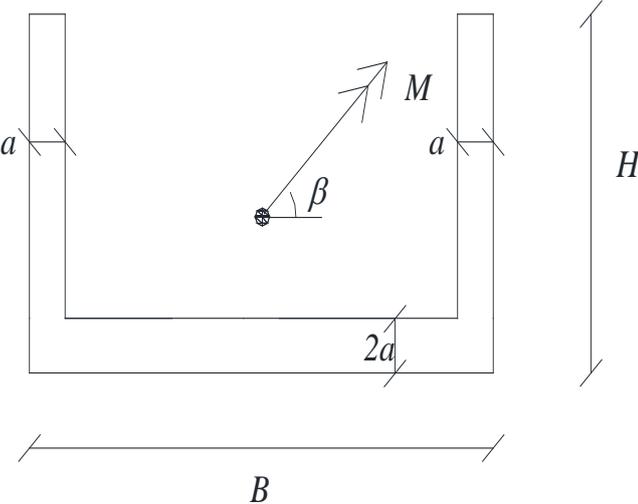


Figure 1: Cross section under bending



QUESTION 2 (30 marks)

Determine the centroid of the cross section depicted in Figure 2 (5 marks). Determine the shear stress distribution due to the Shear force $V_y = 300\text{ kN}$ (20 marks). Determine the maximum shear stress and check if the Von Mises stress exceeds the Yield value ($\sigma_{\text{Yield}} = 400\text{ N/mm}^2$) (5 marks).

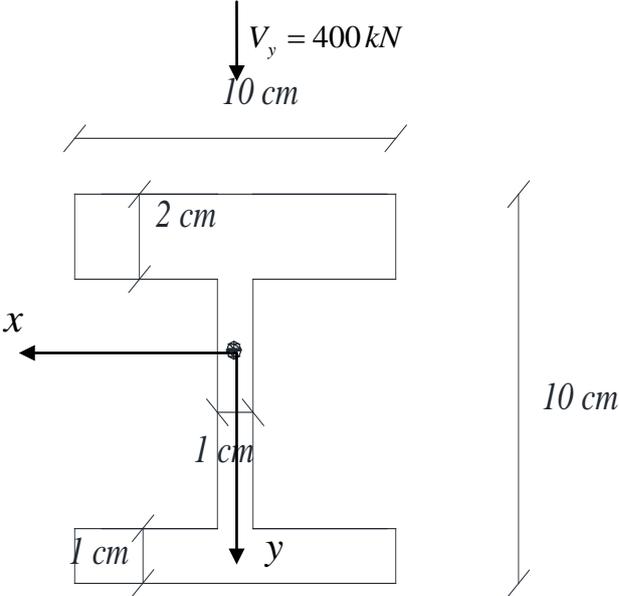


Figure 2: I shape cross section

QUESTION 3 (40 marks)

Determine the stress distribution in the cross section depicted in Figure 3 due to the Shear force $V_y = 10\text{ kN}$ (25 marks) and compressive axial force $N^{(-)} = 20\text{ kN}$ (10 marks). Identify the critical points (5 marks).

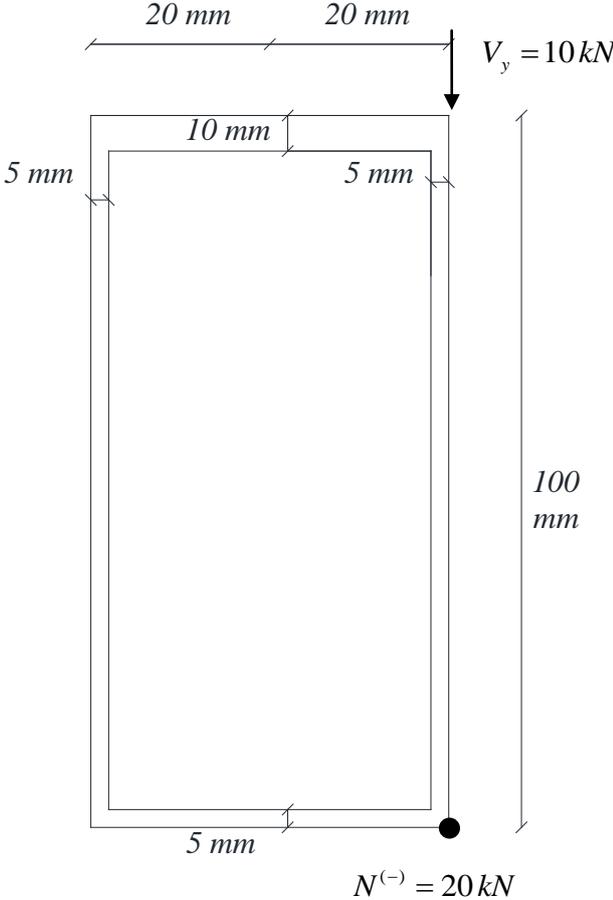


Figure 3: Rectangular hollow cross section

