



**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  $M=500$  kNm (15 marks) Draw the normal stress diagram (8 marks). Identify the critical points (2 marks) considering  $H = 20$  cm;  $B = 15$  cm;  $a = 2$  cm;  $\beta = 30^\circ$

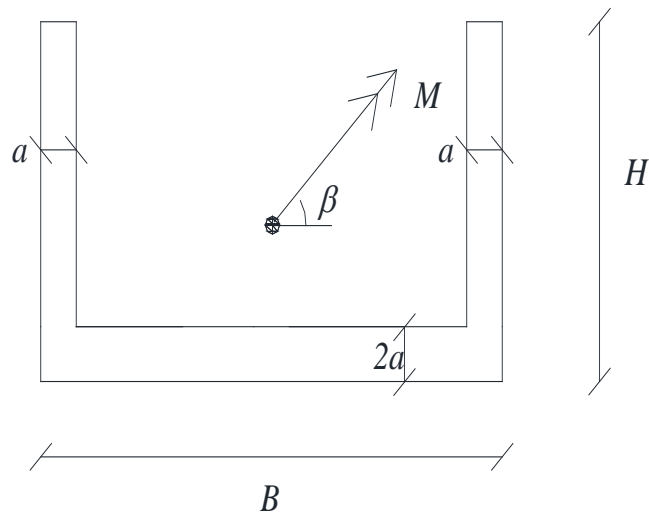


Figure 1: Cross section under bending





## 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).

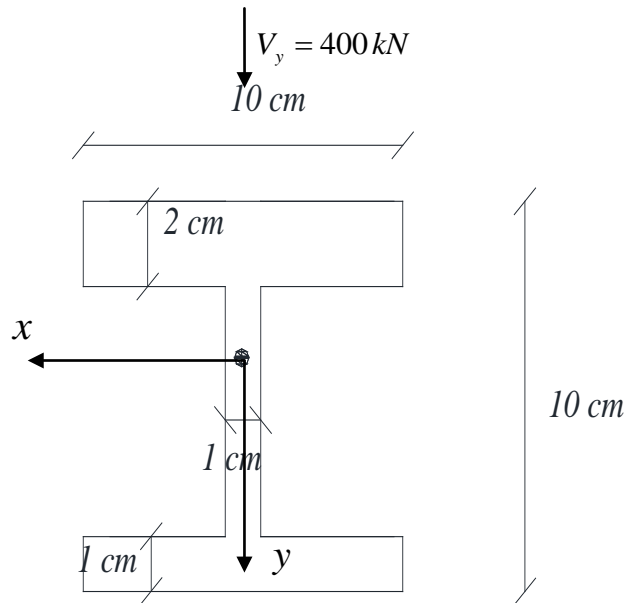


Figure 2: I shape cross section



### 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).

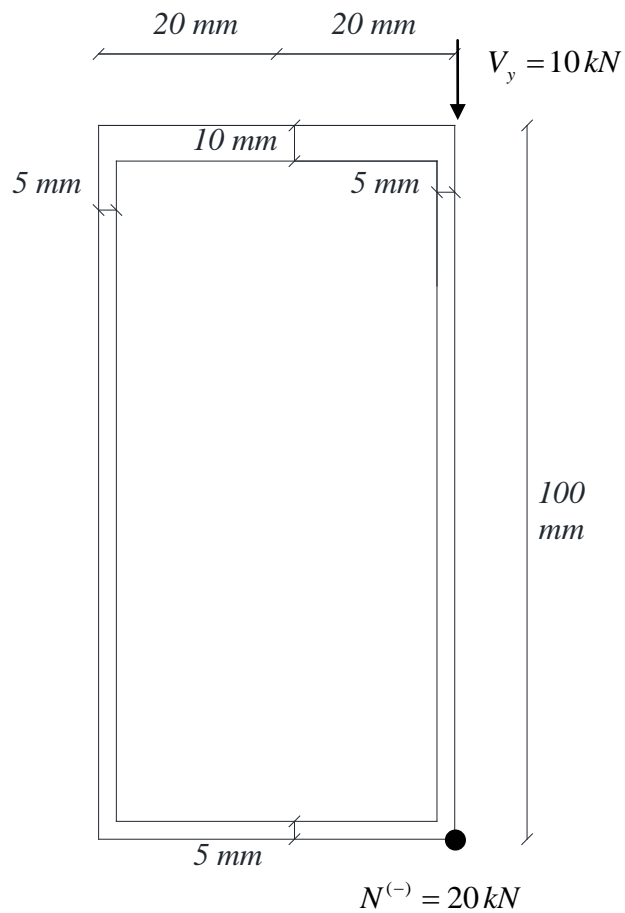


Figure 3: Rectangular hollow cross section

