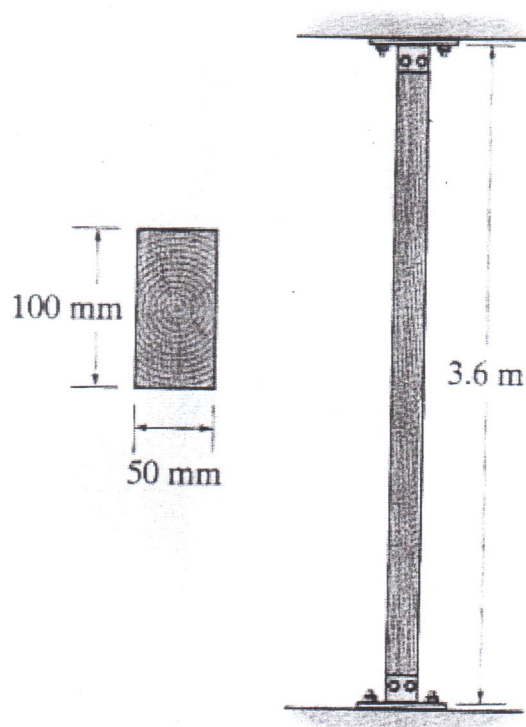




## Stress analysis (ME 276)

### Sheet No. 7.

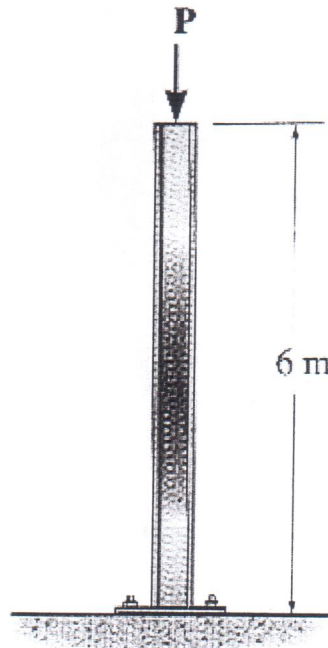
- (1) A 1.25 m long rod is made from a 25 mm diameter steel rod. Determine the critical buckling load if the both ends are fixed supported.  $E = 200$  GPa.
- (2) A 3.6 m long wooden rectangular column has the dimensions shown in **Figure 1**. Determine the critical load if the both ends are assumed to be fixed supported.  $E = 12$  GPa.



**Figure 1.**

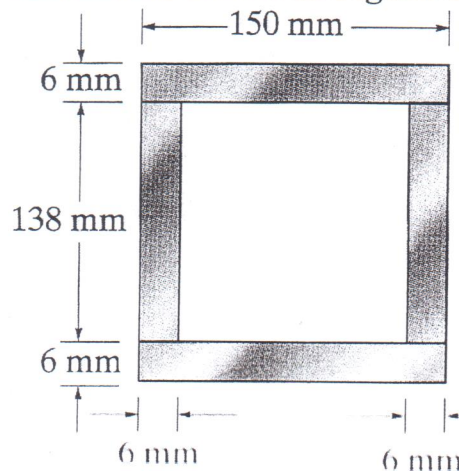
- (3) A **W360 X 57** column is made of **A-36** steel ( $E = 200$  GPa,  $I_X = 160 \times 10^6 \text{ mm}^4$  and  $I_Y = 11.1 \times 10^6 \text{ mm}^4$ ). The column is fixed supported at its base and free at the top. If the column is subjected to an axial load  $P = 75$  kN, determine the factor of safety with respect to buckling.

- (4) The **W360 X 57** column, shown in **Figure 2**, is made of **A-36** steel ( $E = 200 \text{ GPa}$ ,  $I_X = 160 \times 10^6 \text{ mm}^4$  and  $I_Y = 11.1 \times 10^6 \text{ mm}^4$ ). Determine the critical load,  $P_{cr}$ , if the lower end of the column is fixed supported and the upper end is free to move about the strong axis (X-axis) and is pinned about the weak axis (Y-axis).



**Figure 2.**

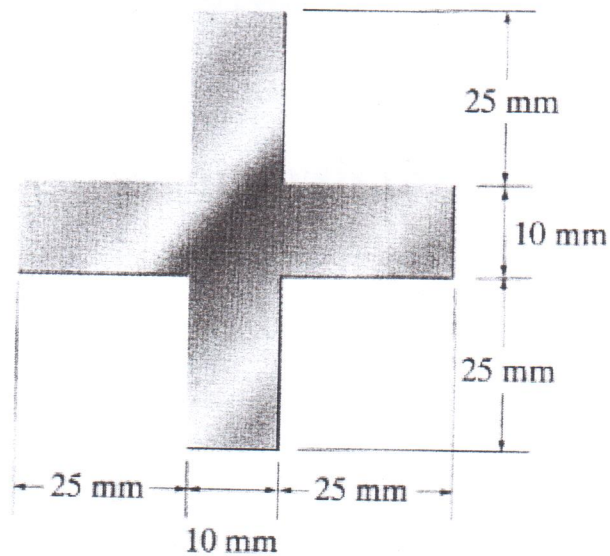
- (5) A column is made of **A-36** steel ( $E = 200 \text{ GPa}$ ,  $I_X = 160 \times 10^6 \text{ mm}^4$  and  $I_Y = 11.1 \times 10^6 \text{ mm}^4$ ) has a length of 6 m and is pinned at both ends. If the cross-sectional area has the dimensions shown in **Figure 3**, determine the critical load.



**Figure 3.**

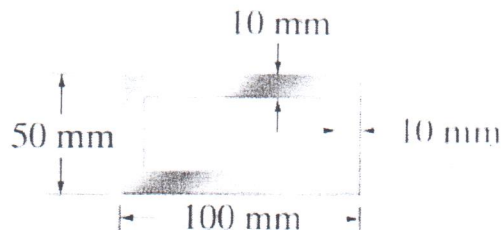
- (6) A column is made of **2014-T6** aluminum ( $E = 73 \text{ GPa}$ ) has a length of 9 m and is fixed at its bottom and pinned at its top. If the cross-sectional area has the dimensions shown in **Figure 3**, determine the critical load.

- (7) An A-36 steel column ( $E = 200 \text{ GPa}$ ) has a length of 4 m and is pinned at both ends. If the cross-sectional area has the dimensions shown in **Figure 4**, determine the critical load.



**Figure 4.**

- (8) Solve problem (7) if the column is fixed supported at its bottom and pinned at its top.
- (9) An A-36 steel column ( $E = 200 \text{ GPa}$ ) has a length of 5 m and is fixed supported at both ends. If the cross-sectional area has the dimensions shown in **Figure 5**, determine the critical load.



**Figure 5.**