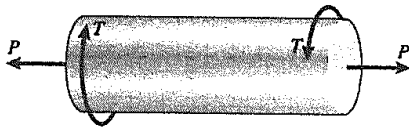


Problem 1 (25%)

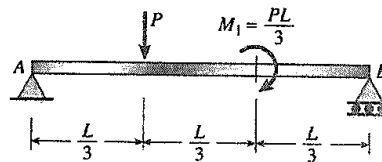
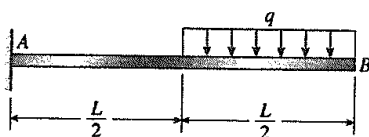
A cylindrical pressure vessel with flat ends is subjected to a torque T and tensile forces P . The tank has a radius $r = 125$ mm and the wall thickness $t = 6.5$ mm. The loads are $T = 850$ N·m, $P = 400$ kN, and the internal pressure $p = 7.25$ MPa.

Determine the maximum shear stress τ_{\max} in the wall of the cylinder.



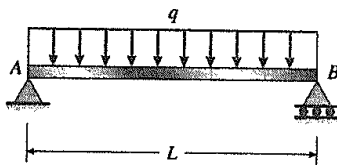
Problem 2 (25%)

Draw the shear-force and bending-moment diagrams for the beams shown in the figure below.



Problem 3 (25%)

Using moment-area method, obtain formula for the maximum deflection δ_{\max} at the midpoint for a simple beam AB with a uniform load of intensity q .



Problem 4 (25%)

A stepped shaft ACB is held against rotation at ends A and B and subjected to a torque T_0 acting at section C . The two segments of the shaft have diameters d_A and d_B , respectively, and polar moments of inertia I_{pA} and I_{pB} , respectively. The shaft has length L and segment AC has length a . For what ratio a/L will the maximum shear stresses be the same in both segments of the shaft?

