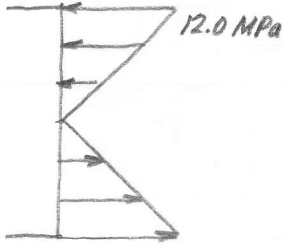


6-57

$$I = \frac{1}{12} (0.240\text{m})(0.240\text{m})^3 - (2) \frac{1}{12} (0.090\text{m})(0.200\text{m})^3 = 1.5648 \times 10^{-4} \text{m}^4$$



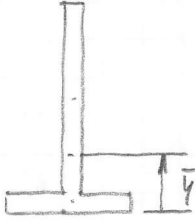
$$\sigma_{@D} = \frac{-M_y}{I} \rightarrow -10 \times 10^6 \frac{\text{N}}{\text{m}^2} = \frac{-M(0.100\text{m})}{1.5648 \times 10^{-4} \text{m}^4}$$

$$M = 15,648 \text{ N}\cdot\text{m} \quad \text{or } \boxed{15.6 \text{ kN}\cdot\text{m}}$$

$$\sigma_{\text{max}} = \frac{Mc}{I} = \frac{(15,648 \text{ N}\cdot\text{m})(0.120\text{m})}{1.5648 \times 10^{-4} \text{m}^4}$$

$$= 12.0 \times 10^6 \frac{\text{N}}{\text{m}^2} \quad \text{or } \boxed{12.0 \text{ MPa}}$$

6-81



$$\bar{y} = \frac{(0.030\text{m})(0.300\text{m})(0.190\text{m}) + (0.300\text{m})(0.030\text{m})(0.015\text{m})}{(0.030\text{m})(0.300\text{m}) + (0.300\text{m})(0.030\text{m})} = 0.0975\text{m}$$

$$I = \frac{1}{12} (0.030\text{m})(0.300\text{m})^3 + (0.030\text{m})(0.300\text{m})(0.190\text{m} - 0.0975\text{m})^2$$

$$+ \frac{1}{12} (0.300\text{m})(0.030\text{m})^3 + (0.300\text{m})(0.030\text{m})(0.015\text{m} - 0.0975\text{m})^2$$

$$= 6.75 \times 10^{-5} \text{m}^4 + 6.1256 \times 10^{-5} \text{m}^4 + 6.75 \times 10^{-7} \text{m}^4 + 6.1256 \times 10^{-5} \text{m}^4$$

$$= 1.9069 \times 10^{-4} \text{m}^4$$

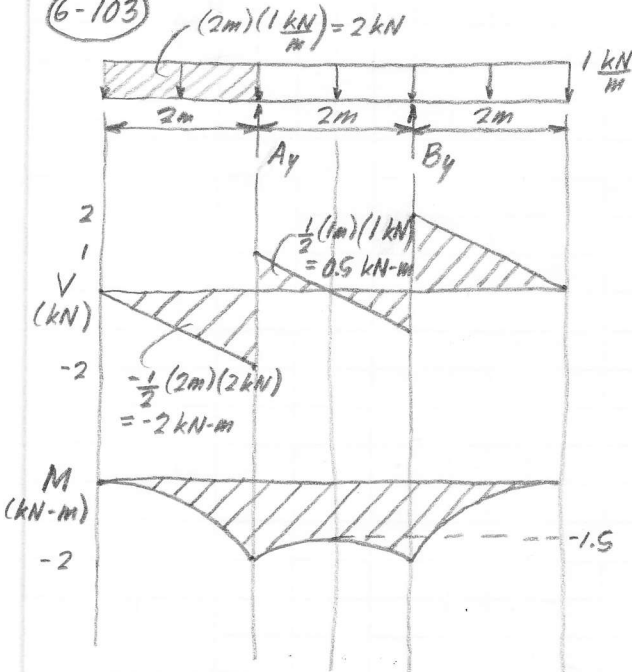
$$\sigma_{\text{max compression (top)}}: 150 \times 10^6 \frac{\text{N}}{\text{m}^2} = \frac{M(0.330\text{m} - 0.0975\text{m})}{1.9069 \times 10^{-4} \text{m}^4}$$

$$M = 123,024.2 \text{ N}\cdot\text{m} \quad \text{or } \boxed{123 \text{ kN}\cdot\text{m}}$$

$$\sigma_{\text{max tension (bottom)}}: 125 \times 10^6 \frac{\text{N}}{\text{m}^2} = \frac{M(0.0975\text{m})}{1.9069 \times 10^{-4} \text{m}^4}$$

$$M = 244,474.4 \text{ N}\cdot\text{m} \quad \text{or } \boxed{244 \text{ kN}\cdot\text{m}}$$

6-103



$$\sum M_A = 0, (2\text{kN})(1\text{m}) - (4\text{kN})(2\text{m}) + (B_y)(2\text{m}) = 0$$

$$B_y = 3\text{kN}$$

$$\sum F_y = 0, 6\text{kN} - 3\text{kN} - A_y = 0$$

$$A_y = 3\text{kN}$$

$$M_{\text{max}} = -2 \text{ kN}\cdot\text{m} \quad I = \frac{1}{12} (0.050\text{m})(0.150\text{m})^3$$

$$= 1.40625 \times 10^{-5} \text{m}^4$$

$$\sigma_{\text{max}} = \frac{(2 \text{ kN}\cdot\text{m})(0.075\text{m})}{1.40625 \times 10^{-5} \text{m}^4} = 10,666.67 \frac{\text{kN}}{\text{m}^2}$$

$$\text{or } \boxed{10.7 \text{ MPa}}$$

