ANSWERS - VOLUME2: STRESSES, STRAINS, DISPLACEMENTS

Chapter 4, Members Subject to Bending and Extension

problem 4.077, page 258

Remarks: See §4.4, pages 168 till 170 See §4.5, pages 171 till 184

Hint:

Draw the shear force diagram and the moment diagram

Answers:

- a. In the section 3 meters right of the left support
- b. $\sigma_b = +100,4 \text{ N/mm}^2$

$$\sigma_{\rm t} = -100, 4 \text{ N/mm}^2$$

Explanation:

Support reactions: 37 kN (↑) left-side and 148 kN (↑) right-side.

Moment extremes are where the shear force is zero or where the sign changes.

- Maximum span moment: $M = 92.5 \text{ kNm } (\bigcirc)$; this is 3 meters right from the left support, where $V_z = 0$
- Support point moment: M = 74 kNm ()

The span moment is greater, therefore:

$$\sigma_{\text{max}}^{(M)} = \frac{(92,5 \times 10^6 \text{ Nmm})(180 \text{ mm})}{165,888 \times 10^6 \text{ mm}^4} = 100,4 \text{ N/mm}^2$$

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