

Answers for Problems 4

4.1

Material A: Young's modulus: $E_A = \frac{100P}{A}$, Yields stress: $\sigma_{Ay} = \frac{P}{A}$, Tensile strength: $\sigma_{AB} = \frac{2P}{A}$

Material B: Young's modulus: $E_B = \frac{150P}{A}$, Yield stress: $\sigma_{By} = \frac{3P}{2A}$, Tensile strength: $\sigma_{BB} = \frac{9P}{4A}$

4.2

$$(1) E = \frac{\sigma_1}{\varepsilon_1}$$

$$(2) \varepsilon_2 = \sigma_2 \frac{\varepsilon_1}{\sigma_1} \quad L' = L + \varepsilon_2 L = \left(1 + \frac{\sigma_2}{\sigma_1} \varepsilon_1\right) L$$

$$(3) P = \frac{\pi d^2}{4} \sigma_4$$

4.3

$$(1) \frac{F_1}{A_0} \frac{L_0}{L_1 - L_0}$$

$$(2) \frac{F_1}{A_0}$$

$$(3) \frac{F_2}{A_0}$$

$$(4) \frac{F_1}{A_0 S} = \frac{F_Q}{A_Q} \quad A_Q = \frac{F_Q}{F_1} AS$$