Remarks: See §4.8, pages 198 till 203

Answers:

a. $\sigma_A = -30\sigma$
$\sigma_B = -6\sigma$
$\sigma_C = +18\sigma$
$\sigma_D = +18\sigma$

c. Equation of the neutral axis $z = 2y$

Explanation:

Cross-sectional properties:

$I_{yy} = \frac{1}{12}t(4a)^3 + \frac{1}{12}2t(2a)^3 = \frac{20}{3}a^3t$

$I_{zz} = 4at(a)^2 + \frac{1}{12}2t(2a)^3 + 4at(a)^2 = \frac{26}{3}a^3t$

a. $\sigma(y,z) = \dfrac{(-80\sigma a^2 t)\times y}{\frac{20}{3}a^3t} + \dfrac{(+52\sigma a^2 t)\times z}{\frac{26}{3}a^3t}$

$\sigma_A = \dfrac{(-80\sigma a^2 t)(+2a)}{\frac{20}{3}a^3t} + \dfrac{(+52\sigma a^2 t)(-a)}{\frac{26}{3}a^3t} = -30\sigma$

$\sigma_B = \dfrac{(-80\sigma a^2 t)(+a)}{\frac{20}{3}a^3t} + \dfrac{(+52\sigma a^2 t)(+a)}{\frac{26}{3}a^3t} = -6\sigma$

$\sigma_C = \dfrac{(-80\sigma a^2 t)(-a)}{\frac{20}{3}a^3t} + \dfrac{(+52\sigma a^2 t)(+a)}{\frac{26}{3}a^3t} = +18\sigma$

$\sigma_D = \dfrac{(-80\sigma a^2 t)(-a)}{\frac{20}{3}a^3t} + \dfrac{(+52\sigma a^2 t)(-2a)}{\frac{26}{3}a^3t} = +18\sigma$

c. Equation of the neutral axis: $\sigma(y,z) = 0 \Rightarrow z = 2y$