

3C7 2010: Answers

$$\begin{aligned} 1.(a) \quad \sigma_{xx} &= \frac{w}{10d^3} [6d^2y - 15l^2y + 60x^2y - 40y^3]; \\ \sigma_{yy} &= \frac{w}{2d^3} [-d^3 - 3yd^2 + 4y^3]; \\ \sigma_{xy} &= \frac{w}{2d^3} [-12xy^2 + 3xd^2] \end{aligned}$$

$$2.(b.i) \quad 539 \text{ rad s}^{-1}; 381 \text{ rad s}^{-1}$$

$$3.(a) \quad \sigma_{rr} = \frac{2C}{r} \cos \theta; \sigma_{\theta\theta} = 0; \sigma_{r\theta} = 0$$

$$(d) \quad \sigma_{xx} = \frac{2P}{\pi D}$$

$$4.(b) \quad \text{One mechanism gives } p = 2k \left(\frac{y}{a} + \frac{a}{y} \right)$$

$$(c) \quad z = \sqrt{2} + 1$$