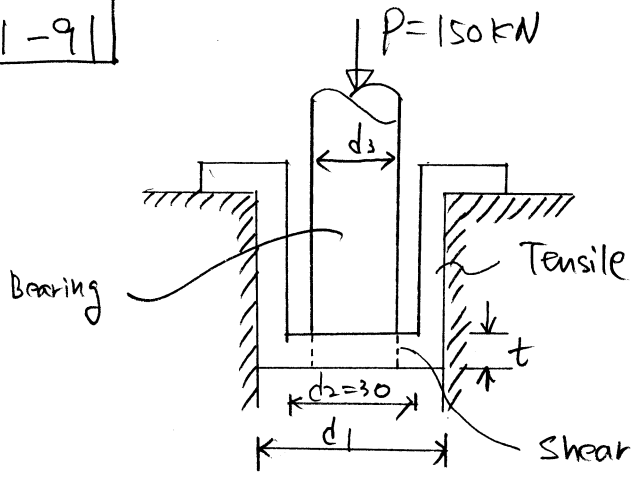
12-331 Solid Mechanics

HW #2 Due: 9/12/2000

1-91



< Tensile >

$$\sigma_t = \frac{P}{A}; \quad 175(10^6) = \frac{150(10^3)}{\frac{\pi}{4}(d_1^2 - 0.03^2)}$$

$$d_1 = 44.6\,(mm)$$

< Bearing >

$$\sigma_B = \frac{P}{A}; \quad 275(10^6) = \frac{150(10^3)}{\frac{\pi}{4}(d_3^2)}$$

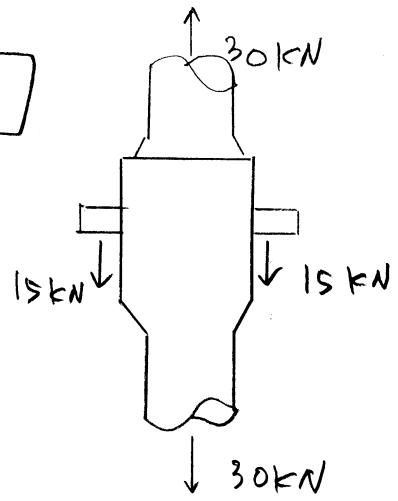
$$d_3 = 26.35\,(mm)$$

< Shear >

$$\tau_s = \frac{V}{A}; \quad 115(10^6) = \frac{150(10^3)}{t(\pi)(0.02635)}$$

$$t = 15.15\,(mm)$$

1-95



Find out the allowable stresses.

$$\sigma_{allow} = \frac{\sigma_{fail}}{F.S} = \frac{500(10^6)}{2.5}$$

$$= 200(10^6)$$

$$\tau_{allow} = \frac{\tau_{fail}}{F.S} = \frac{315(10^6)}{1.15}$$

$$= 214.29(10^6)$$

< Tensile >

$$\sigma_{allow} = \frac{P}{A}; \quad 200(10^6) = \frac{30(10^3)}{\frac{\pi}{4}(d^2)}$$

$$d = 13.82\,(mm)$$

< shear >

$$\tau_{allow} = \frac{V}{A}; \quad 214.29(10^6) = \frac{15(10^3)}{(0.01)t}$$

$$t = 1.00\,(mm)$$