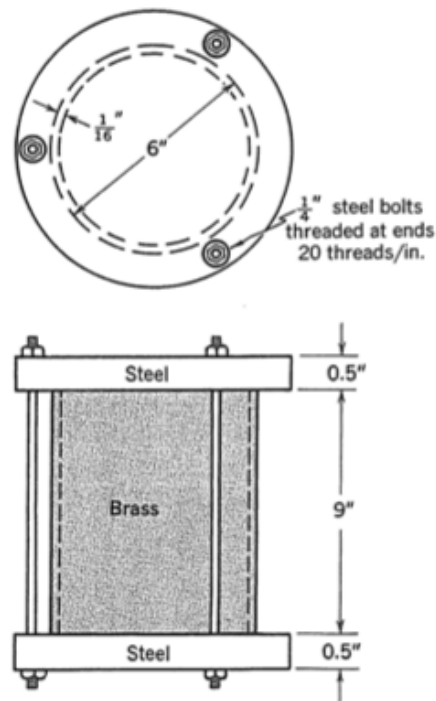


Name: _____ Roll no. _____

Department of Aerospace Engineering, Indian Institute of Technology, Madras.

AS 2010: Basic strength of materials. Quiz 8

1. A small experimental pressure vessel is made from a 9 inch long brass cylinder ($E = 15 \times 10^6$ psi [pounds per square inch]) of 6 inch mean diameter, and $1/16$ inch wall thickness, and two $1/2$ inch thick steel plates held together by three $1/4$ inch diameter steel bolts set on a 7 inch diameter bolt circle. The vessel is put together with nuts on the three bolts brought up snug. Then, each nut is tightened one-half turn additional. Estimate the internal pressure in psi at which the vessel is certain to leak.



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AS 2010: Basic strength of materials. Quiz 8

2. The principal strains in the plane of a thin flat aluminium plate ($E = 70 \text{ GPa}$, $\nu = 0.3$), which is loaded in its plane are

$$\epsilon_1 = 320 \times 10^{-6}, \text{ and}$$

$$\epsilon_2 = -540 \times 10^{-6}.$$

Find the stresses σ_{xx} , σ_{yy} and σ_{xy} , where the x and y axes are located as shown.

