Department of Applied Mechanics

AML 832, major   30/04/2010   2hr.

N.B.   Assume missing Data if any.

Q1. The strain energy of circular plate is <30>
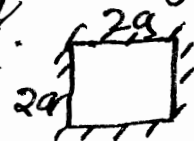
$$U = 2\pi \int_0^a \frac{D}{2}\left[\left(\frac{\partial^2 w}{\partial r^2} + \frac{1}{r}\frac{\partial w}{\partial r}\right)^2 - 2(1-\nu)\frac{\partial w}{\partial r}\frac{\partial^2 w}{\partial r^2}\right]r\,dr$$

derive the equation of equilibrium for an uniformly distributed loaded plate. $D = Eh^3/12(1-\nu^2)$

Q2. using Rayleigh principle determine the 1st fundamental frequency of a clamped square plate.   <25>

Q3. Draw a Free body diagram of a <15>
(a) general shell Element.

(b) Write $\sum F_x = 0$ <10>

(c) Write $\sum m_z = 0$ <10>

(d) show that symmetry of stress tensor ($\tau_{12} = \tau_{21}$) remains for thin shells   <10>

30/04/2010