MAJOR EXAM (AML 731)
Deeember, 2006
Department of Applied Mechanics
IIT Delhi

Time: 2 Hours **Full Marks: 100**

1. Derive the equation for complementary energy for torsion of prismatic bar. (14)

   Using Rayleigh-Ritz Method, for torsion of rectangular bar with sides 2a and 2b, derive equation for maximum stress by taking only one undetermined parameter in the assumed polynomial for the stress funetion. (16)

2. (a) Derivc the governing differential equation for small deflection of a thin plate under the action of normal distributed load with intensity p. (10)

   (b) Derive equilibrium equation in Z-direetion for a rectangular plate subjected to bending and stretching. (10)

3. Given that the strains measured in the directions shown in the Fig. 3.1, as $\varepsilon_a = +750\mu$, $\varepsilon_b = -125\mu$, $\varepsilon_c = -250\mu$.

   Find (a) The prineipal strains and the maximum shearing strain. (10)
   (b) Use the results of part (a) to determine the principal stresses and the maximum shearing stress. (E = 200 GPa, $\nu = 0.3$) (10)

4. Find stress eomponents for a long eircular cylinder with a temperature distribution symmetric about its axis. (10)

5. Derive compatibility equation in terms of stress function in cylindrical coordinates for plane stress. (10)

   Determine stress components for a thick cylinder subjected to uniform pressure on the inner and outer surfaces. (10)

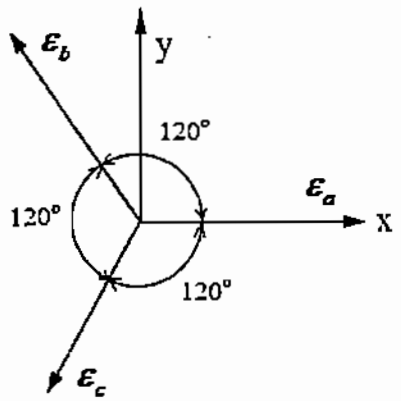

Fig. 3.1