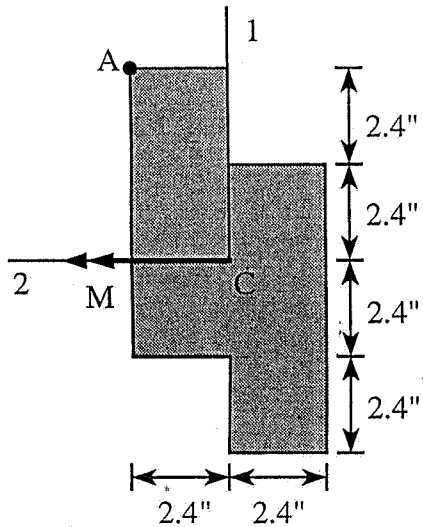
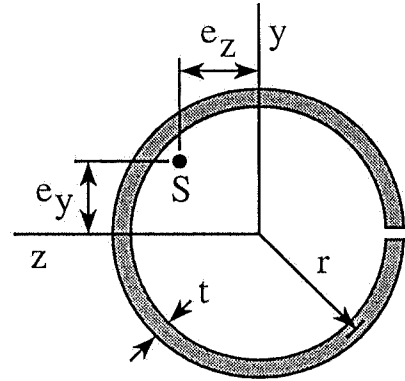
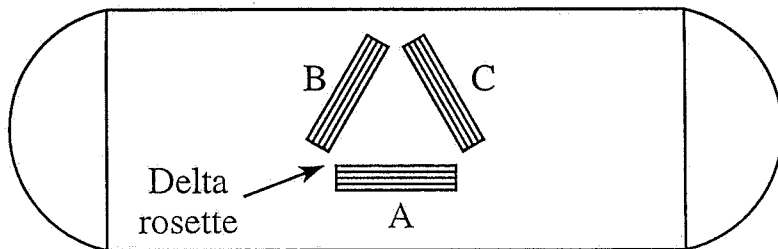
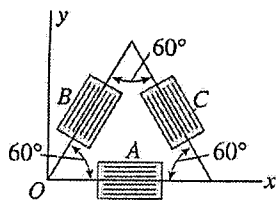


1. Determine the location of the shear center S of a slit thin-walled circular tube with radius r and constant thickness t . (20%)

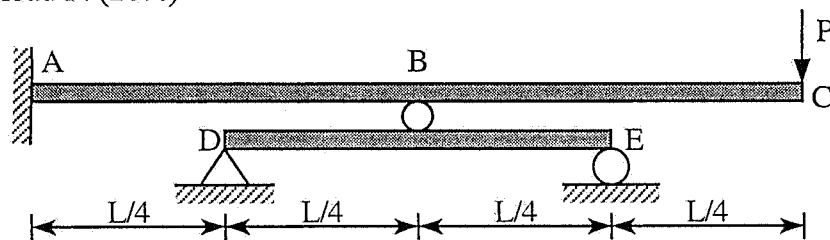


2. The moment $M = 125 \text{ kip-in}$ is applied to a beam cross in the axis 2 direction. Determine (i) the normal stress at point A, (ii) the orientation of the neutral axis. (Hint: $I_1 = 66.36 \text{ in}^4$, $I_2 = 199.06 \text{ in}^4$). (20%)

3. A 60° strain-gage rosette (or delta rosette) is mounted on a cylindrical compressed air tank. The recorded strains are $\epsilon_a = 80 \times 10^{-6}$ and $\epsilon_b = \epsilon_c = 275 \times 10^{-6}$. If the tank has the ratio $r/t = 25$ and the inside air pressure $p = 3.2 \text{ MPa}$, calculate the modulus of elasticity E and the Poisson's ratio ν of the tank. (20%)



4. A beam ABC is fixed at end A and supported by beam DE at point B. Both beams have the same cross section and are made of the same materials. Determine all reaction forces and moments at points A, D and E due to the load P. (20%)



5. A rectangular rigid frame of width $7b$ and height $3b$ is pivoted at C, supported at A and D by identical vertical wires, and loaded by an inclined force P acting at B. The diameter of the wires is 2 mm. If the tensile stress in the wires are not to exceed 220 MPa, what is the maximum permissible load P_{\max} ? (20%)

