甲組選考科目
共五題

1. Construct the shear and moment diagrams of beam shown (20%) in Fig. 1, and sketch the deflected curve.

2. From the shear strain and normal strains for the pure-shear (20%) reference element shown in Fig. 2, derive relation among E (modulus of elasticity), ν (Poisson's ratio) and G (shear modulus of elasticity).

3. A cylindrical pressure vessel, 20ft long and 4ft in diameter, with wall (20%) thickness $t = 1/8$ in, is simply supported at each end shown in Fig. 3. The vessel and its contents weigh 900 lb per foot of length, and the contents exert a uniform internal pressure of 30 lb/in² on the vessel. Determine the biaxial stresses on elements A and B of the vessel wall which are located as shown on Fig. 3.

4. For the simple truss shown in Fig. 4, determine the vertical and (20%) horizontal deflections of point C if $E = 200 \times 10^3$ MPa and all areas are 20 cm².

5. Describe (in details) at least two methods to determine the material (20%) property, E, of a beam element. (Bonus point for the third and the fourth methods).

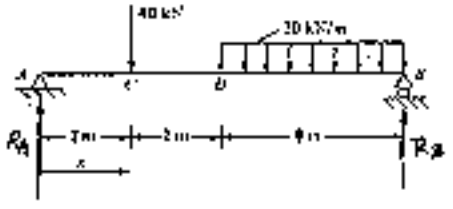

Fig. 1.

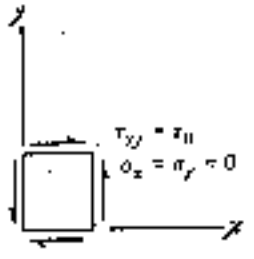

Fig. 2.

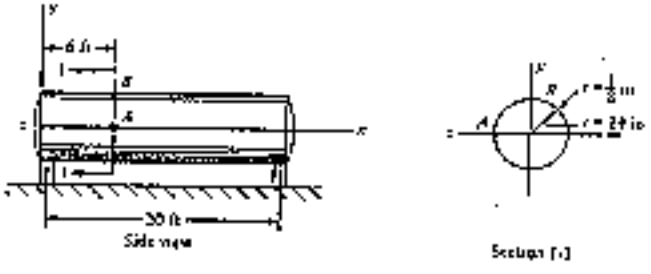

Fig. 3

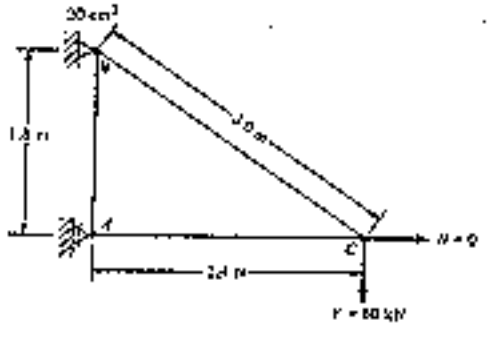

Fig. 4.