系所組別：工程科學系丙、己組
考試科目：材料力學　　　　　　　　　　　　　　　　　　　　考試日期：0223，節次：2

※ 考生請注意：本試題不可使用計算機

1. (20pts) Explain the following terms:
   (a) 0.2% offset yield stress, (b) homogeneous and isotropic material, (c) generalized Hook's law under most multiaxial loading, (d) bulk modulus, (e) dilatation, (f) shear flow, (g) shear center, (h) strain rosette, (i) Euler's formula, (j) strain energy density.

2. (10pts) How to describe the components of stress of a point in a body which is subjected to most general loading conditions.

3. (10pts) The rod AB of length L with a uniform cross-sectional area A is placed between two fixed supports at a distance L from each other, determine the stress in the rod due to the temperature change ΔT (use the coefficient of thermal expansion (α), and modulus of elasticity (E)).
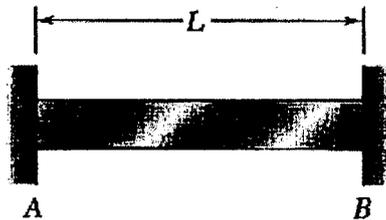

4. (10pts) Draw the shear and bending-moment diagrams for the beam and loading shown.
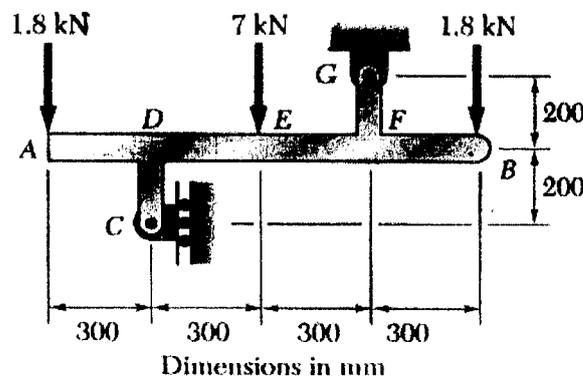
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5. (20pts) A pressure vessel of 250-mm inner diameter and 6-mm wall thickness is fabricated from a 1.2-m section of spirally welded pipe AB and is equipped with two rigid end plates. The gage pressure inside the vessel is 2 MPa and 45-kN centric axial force **P** and **P'** are applied to the end plates. Determine (a) the normal stress perpendicular to the weld, (b) the shear stress parallel to the weld ($\sin 35^\circ = 0.574$, $\cos 35^\circ = 0.819$, $\sin 70^\circ = 0.940$, $\cos 70^\circ = 0.342$).
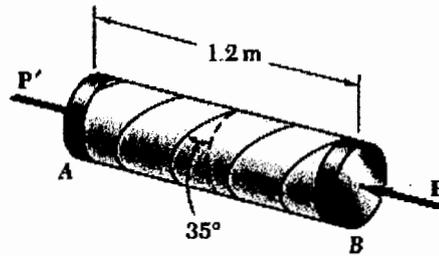
6. (20pts) For the beam and loading shown, determine (a) the deflection at end A, (b) the slope at end D.
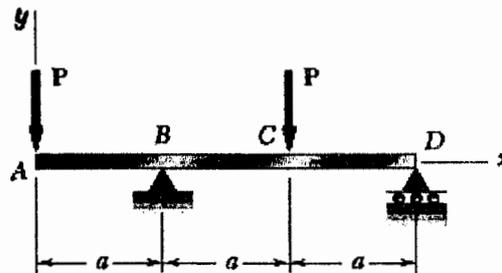
7. (10pts) Each member of the truss shown is made of steel and has a uniform cross-sectional area of 1875 mm^2. Using E = 200 GPa, determine the vertical deflection of joint A caused by the application of the 70 kN load.