

(題目共 7 題 100 分)

1. What is Saint-Venant's principle? Use "Stress and strain distribution under axial loading" as an example to explain the principle. (10%)
2. In all textbooks, we always employ the deformations of a prismatic member possessing a plane of symmetry to derive the "elastic flexure formula". ($\sigma = \frac{My}{I}$) What are the hypotheses? (10%)
3. Give the definitions of the following terms:
 a) strain energy & strain-energy density, and b) Castigliano's Theorem (10%)
4. Derive " Euler's formula" for a pin-ended column. ($P_{cr} = \frac{\pi^2 EI}{L^2}$) (20%)
5. Explain the differences between plane stress and plane strain. (10%)
6. The rigid castings A and B are connected by two 0.75-in.-diameter steel bolts CD and GH and are in contact with the ends of a 1.5-in.-diameter aluminum rod EF. Each bolt is single-threaded with a pitch of 0.1 in., and after being snugly fitted, the nuts at D and H are both tightened one-quarter of a turn. Knowing that E is 29×10^6 psi for steel and 10.1×10^6 psi for aluminum, determine the normal stress in the rod. (Fig. 6) (20%)
7. For the Prismatic beam and loading shown in Fig. 7, determine the reactions at the supports and sketch the deflection curve of the beam. (20%)

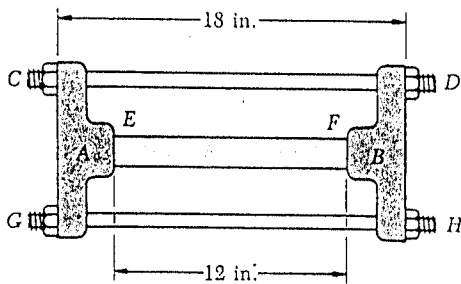


Fig. 6

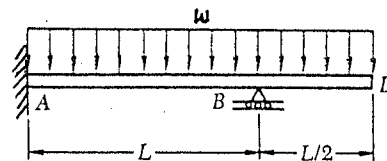


Fig. 7