

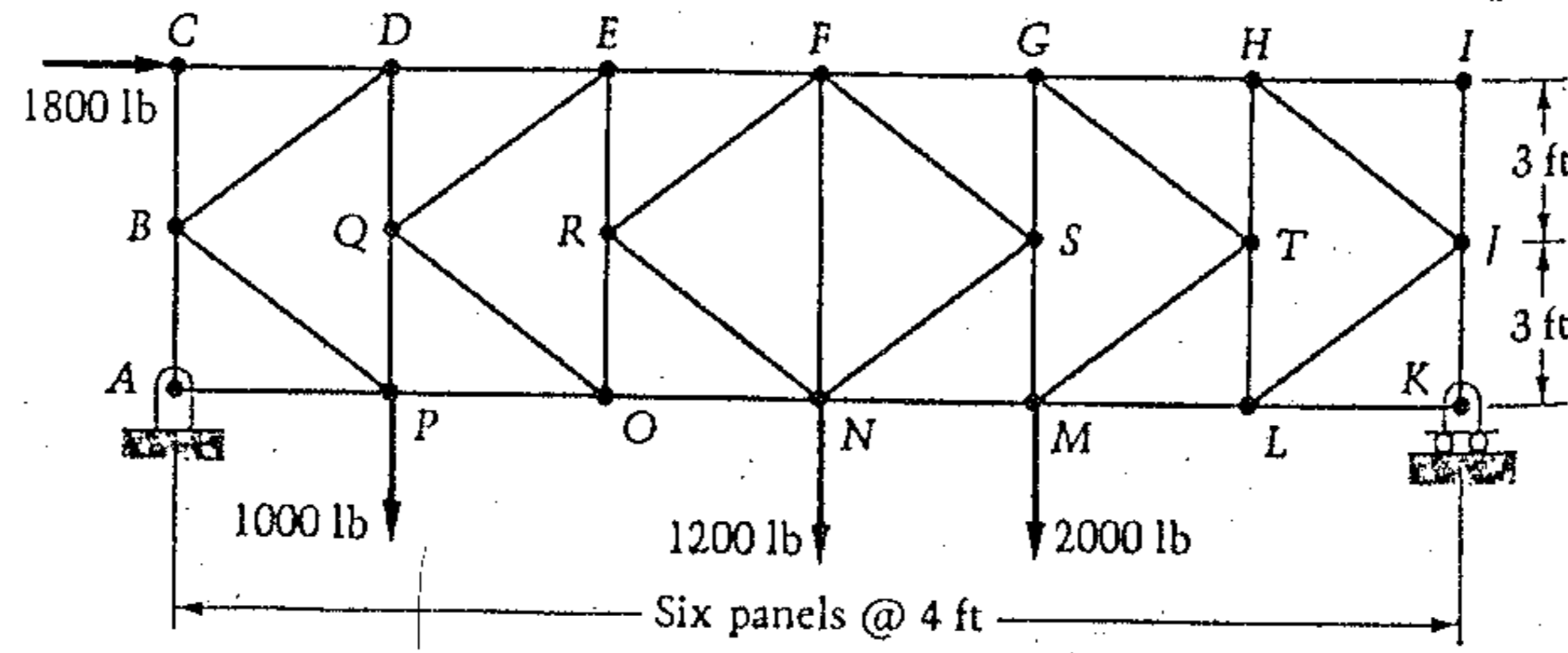
淡江大學八十八學年度日間部轉學生招生考試試題

系別：航太工程學系三年級

科目：工程力學 (含靜力學、材料力學)

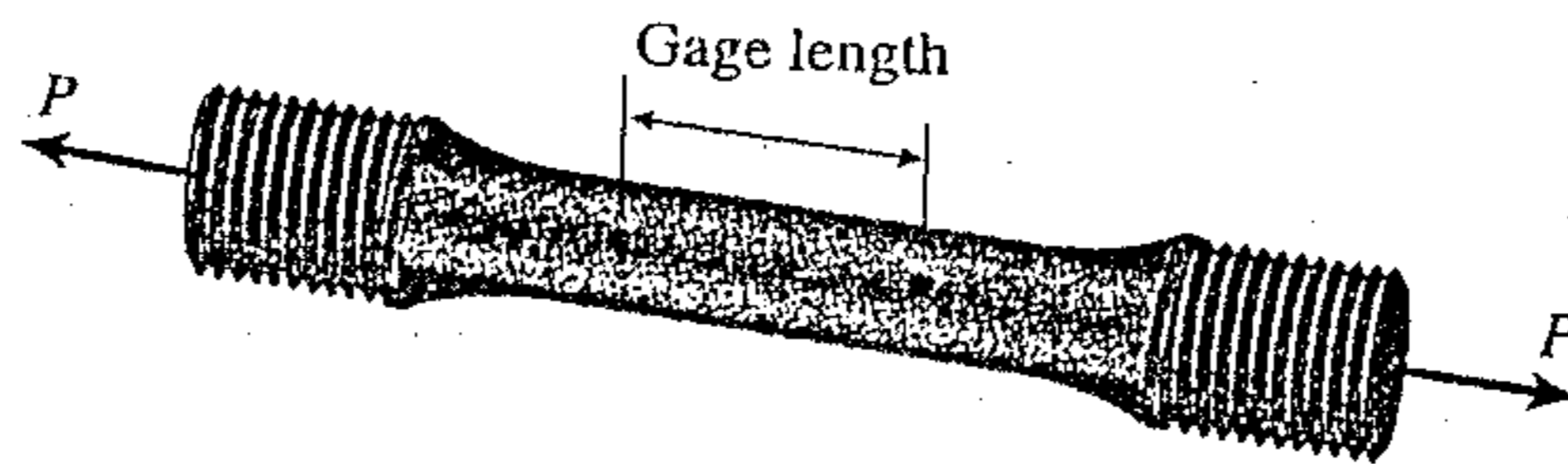
本試題共 / 頁

1. (20%) Find the forces in members DE, QE, and OP of the truss shown in the following figure.

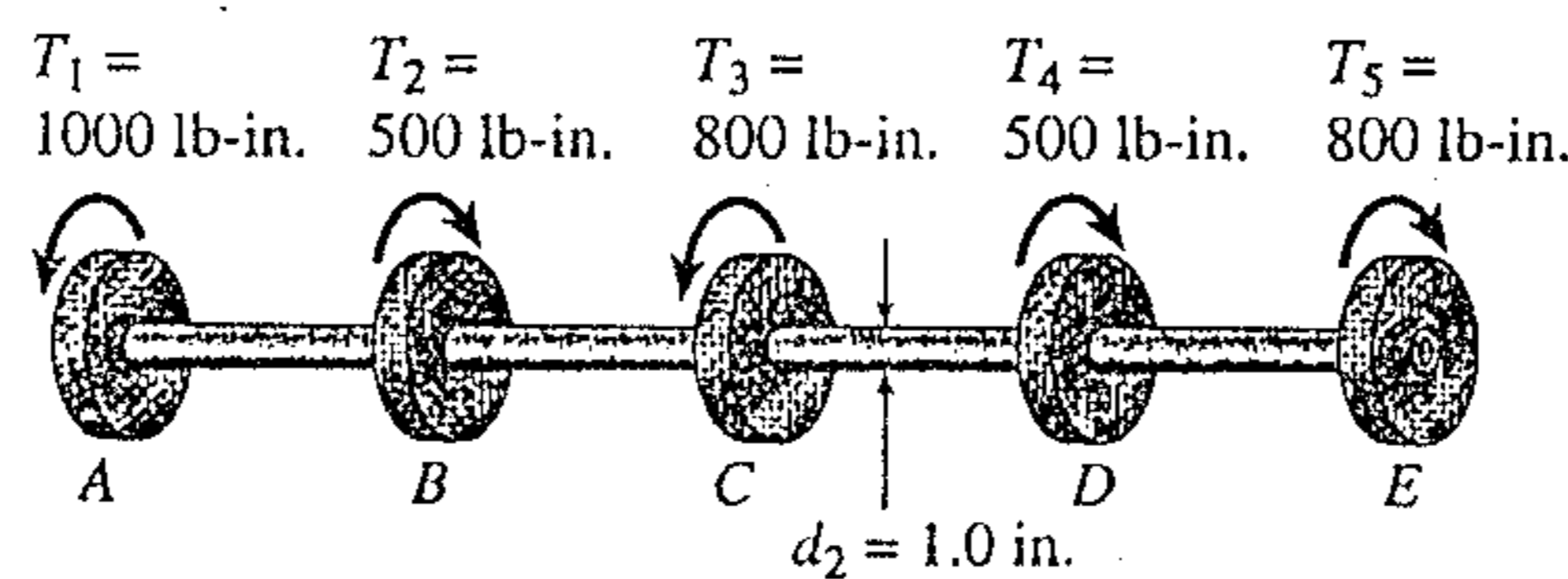


2. (20%) A tension test is performed on a bar. The bar is 1.283 cm in diameter, with a gage length (distance between two chosen points along the bar) of 5 cm. The extension Δl between these two points is measured during the tension test. The bar is loaded elastically with a force of 1.56×10^5 N. Under this load, the gage length is elongated by 0.0356 cm and the diameter of the bar is 1.280 cm.

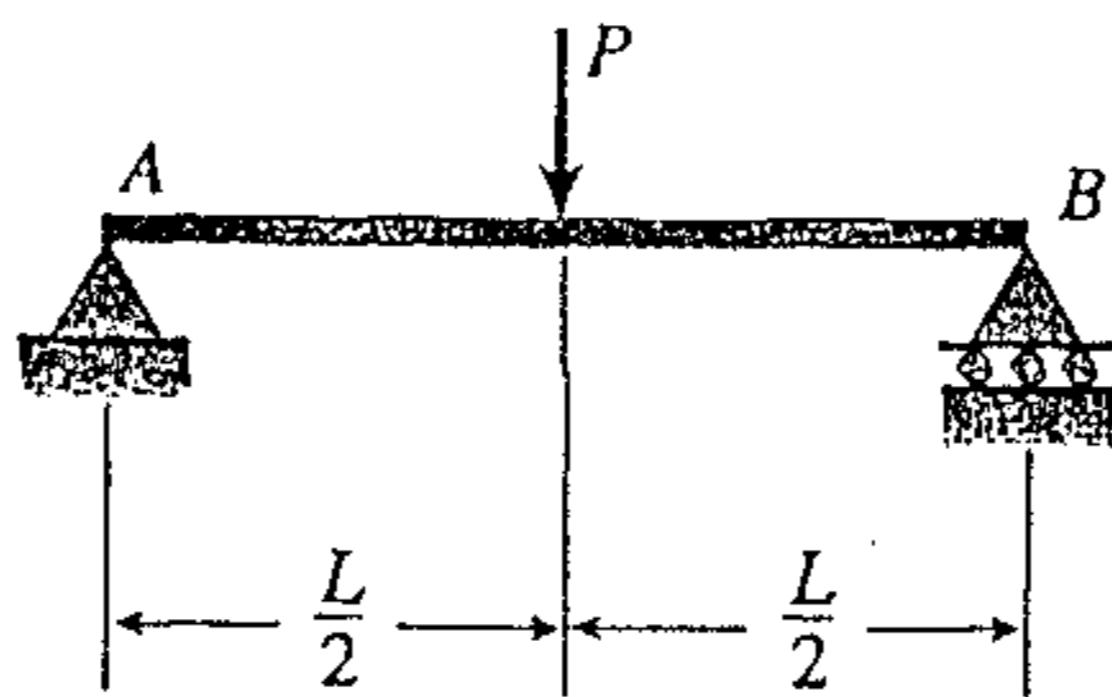
- What is the modulus of elasticity (E) of the bar? (5%)
- What is the Poisson's ratio (ν) of the bar? (5%)
- What is the bulk modulus (K) of the bar? (5%)
- What is the shear modulus (G) of the bar? (5%)



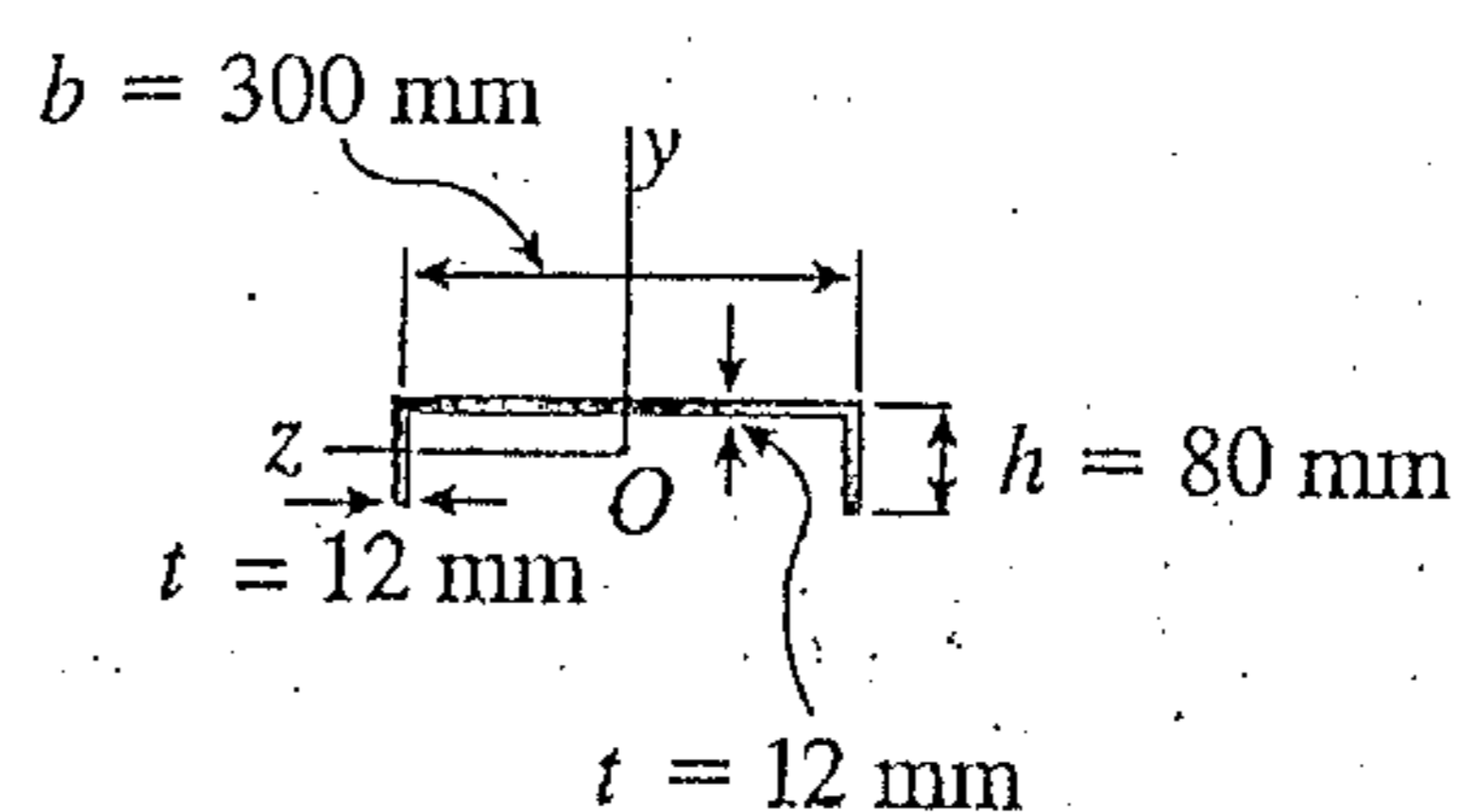
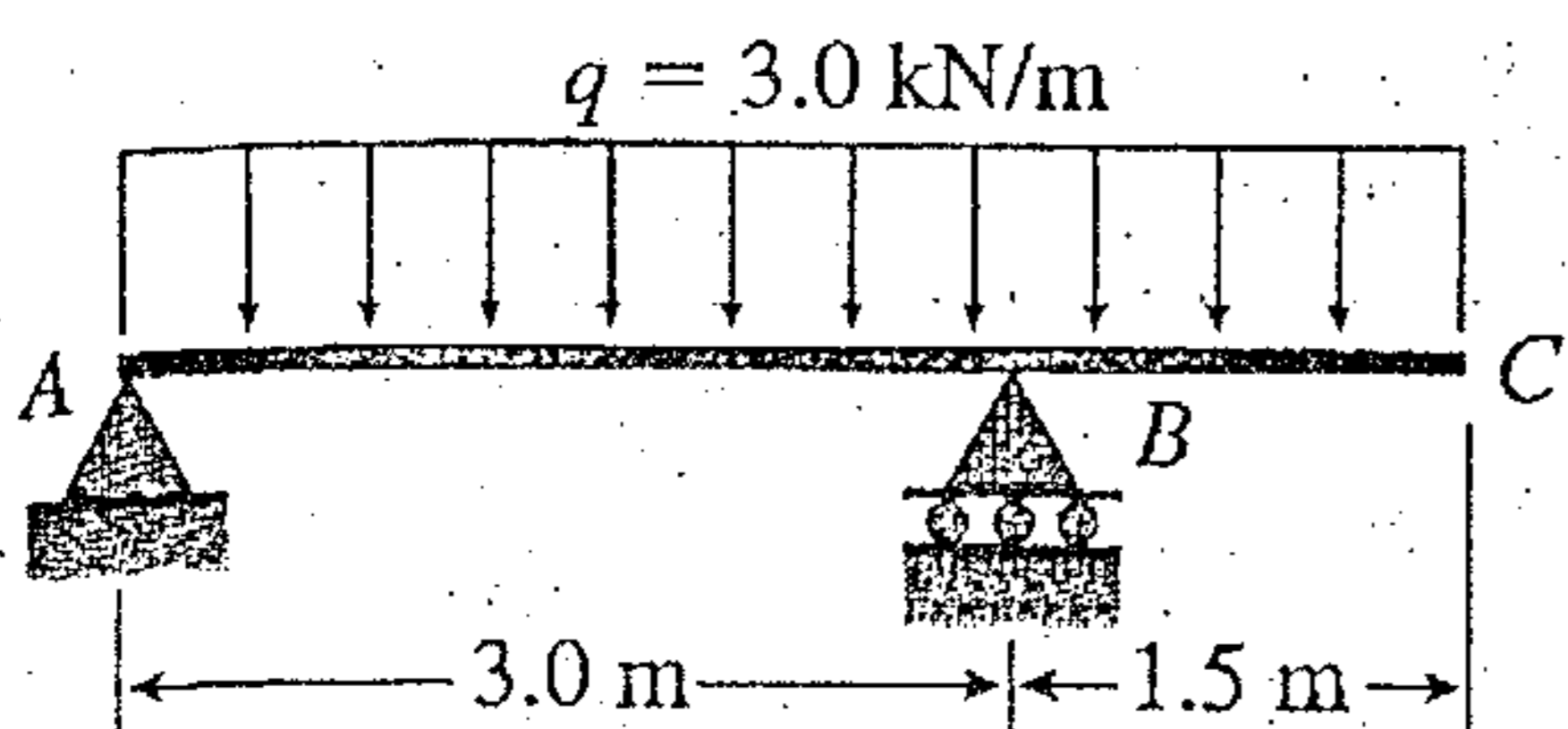
3. (20%) A hollow tube AE constructed of monel metal ($G = 9.5 \times 10^6$ psi) is subjected to five torques acting in the directions shown in the following figure. The magnitudes of the torques are $T_1 = 1000$ lb-in., $T_2 = T_4 = 500$ lb-in., and $T_3 = T_5 = 800$ lb-in. The tube has an outside diameter $d_2 = 1.0$ in. The allowable shear stress is 12000 psi and the allowable rate of twist is $2^\circ/\text{ft}$. Determine the maximum permissible inside diameter d_1 of the tube.



4. (20%) A simple beam AB of length L supports a concentrated load P at the midpoint (a) Evaluate the strain energy of the beam from the bending moment in the beam. (10%) (b) From the strain energy, determine the deflection δ under the load P . (10%)



5. (20%) The beam ABC shown in the following figure has simple supports at A and B and an overhang from B to C . A uniform load of intensity $q = 3$ kN/m acts throughout the length of the beam. The beam is constructed of three steel plates (thickness $t = 12$ mm) welded to form a channel section that has width $b = 300$ mm and height $h = 80$ mm. Construct (a) the shear force diagram (5%) and (b) bending moment diagram for this beam (5%); Determine (c) the maximum tensile stresses (5%) and (d) the maximum compressive stresses (5%) in the beam due the uniform load.



(a)

(b)