(20分) Prob. 1 — The brass strip AB has been attached to a fixed support at A and rests on a rough support at B. Knowing that the coefficient of friction is 0.60 between the strip and the support at B, determine the decrease in temperature for which "slipping will impend"(即被迫滑動).

Brass strip:
$E = 105$ GPa
$\alpha = 20 \times 10^{-6}/^{\circ}C$

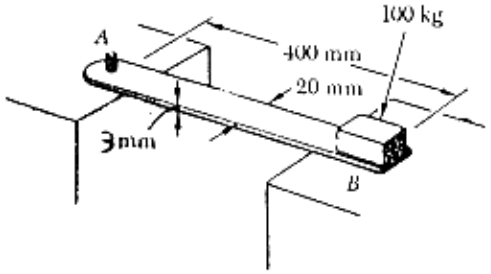

Fig. Prob.1

(20分) Prob 2 — A circular shaft AB consists of a 250-mm-long, 20-mm-diameter steel cylinder, in which a 125-mm-long, 16-mm-diameter cavity has been drilled from end B. The shaft is attached to fixed supports at both ends, and a 120-N · m torque is applied at its midsection (Fig. Prob 2). Determine the torque exerted on the shaft by each of the supports.

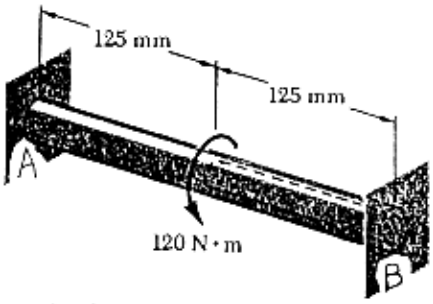

Fig. Prob 2

(20分) Prob3 — A bar obtained by bonding together pieces of steel ($E_s = 200$ GPa) and brass ($E_b = 100$ GPa) has the cross section shown (Fig. Prob 3). Determine the maximum stress in the steel and in the brass when the bar is in pure bending with a bending moment $M = 2$ kN · m.

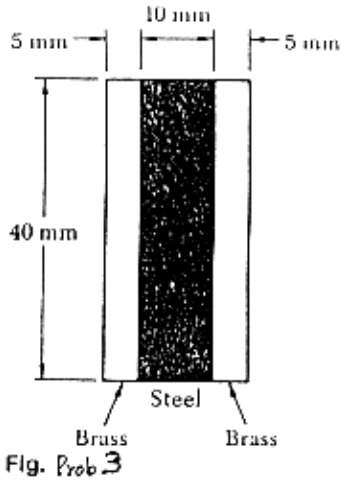

Fig. Prob 3

(背面仍有題目,請繼續作答)

6-1003C

(20分) Prob. 4—A thin plate of 2-mm thickness is bent as shown and then used as a beam. For a vertical shear of 4 kN, determine the shearing stress at the a, b points indicated and sketch the shear flow in the cross section.

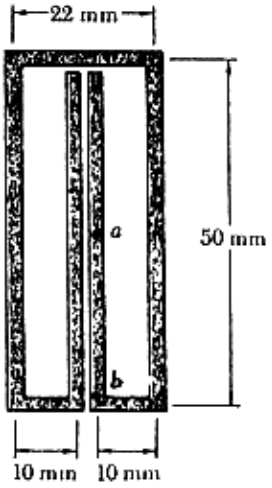

Fig. Prob.4

(20分) Prob. 5—A cylindrical storage tank used to transport gas under pressure has an inside diameter of 600 mm and a wall thickness of 20 mm. Strain gages attached to the surface of the tank in transverse and longitudinal directions indicate strains of 255 μ and 60 μ respectively. Knowing that a torsion test has shown that the modulus of rigidity of the material used in the tank is $G = 80$ GPa, determine (*a*) the gage pressure inside the tank, (*b*) the principal stresses and the maximum shearing stress in the wall of the tank.

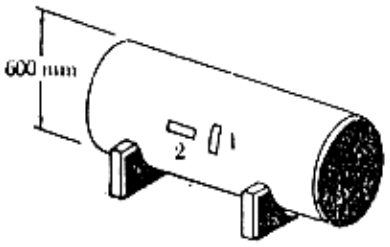

Fig. Prob 5