淡江大學96學年度轉學生招生考試試題

42-1

系別：機械與機電工程學系三年級　科目：工程力學(含靜力學、動力學、材料力學)

可否使用計算機			
可	✓	否	

1. Determine the reactions at the roller A and Pin B shown in Fig. 1. (15%)

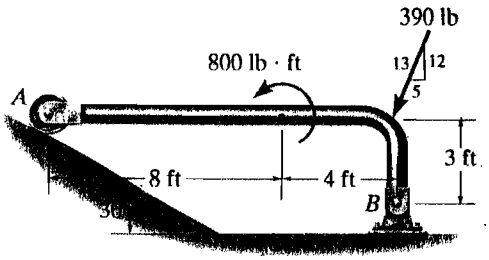

Fig. 1

2. Determine the angle θ for equilibrium of the two-member linkage shown in Fig. 2. Each member has a mass of 10 *kg*. (15%)

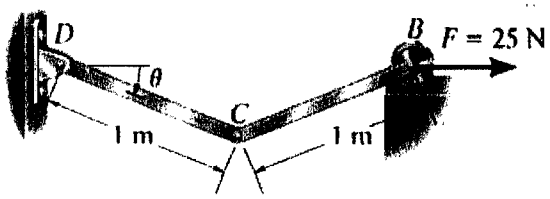

Fig. 2

3. The bars OP and PQ in Fig. 3 rotate in the x-y plane with constant angular velocities. In terms of the fixed coordinate system shown, what is the acceleration of point Q relative to the fixed point O? (15%)

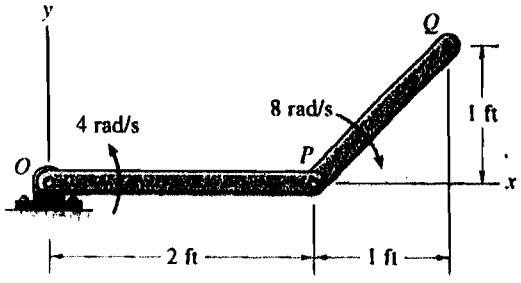

Fig. 3

4. The 100-*lb* crate in Fig. 4 is pulled up the inclined surface by the winch. The coefficient of kinetic friction between the crate and the surface is $\mu_k = 0.4$. The mass moment of inertia of the drum on which the cable is wound, including the cable wound on the drum, is $I_A = 3\ slug - ft^2$. If the motor exerts a couple M = 40 *ft-lb* on the drum, what is the crate's acceleration? (15%)

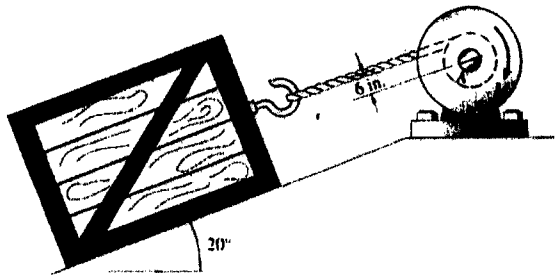

Fig. 4

5. A beam with span L=3 *ft* shown in Fig. 5 is simply supported at points A and B. The uniform load on the beam (including its own weight) is q=160 *lb/in.* The cross section of the beam is rectangular with b=1 *in.* and height h=4 *in.* The beam is adequately supported against sideways buckling. Determine the normal stress σ_C and shear stress τ_C at point C. (20%)

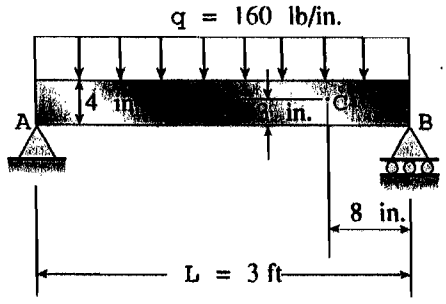

Fig. 5

本試題雙面印製

系別：機械與機電工程學系三年級　科目：工程力學(含靜力學、動力學、材料力學)

可否使用計算機			
可	✓	否	

6. A solid circular steel cylinder S is encased in a hollow circular copper tube C in Fig. 6. The cylinder and tube are compressed between the rigid plates of a testing machine by compressive forces P. The steel cylinder has cross-sectional area A_s As and modulus of elasticity E_s, the copper tube has cross-sectional area A_c and modulus E_c, and both parts have length L. Determine the following quantities: (a) the compressive forces P_s in the steel cylinder and P_c in the copper tube; (b) the corresponding compressive stresses σ_s and σ_c; and (c) the shortening δ of the assembly. (20%)

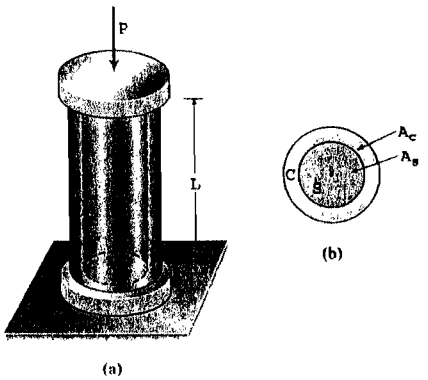

Fig. 6