1. The 340 N homogeneous bar AB rests on the 200 N block C (Figure 1). The coefficient of friction for both sliding surfaces at B and C is 0.2. Determine the force P to produce impending motion to the right. Neglect the friction at pin A. (25%)
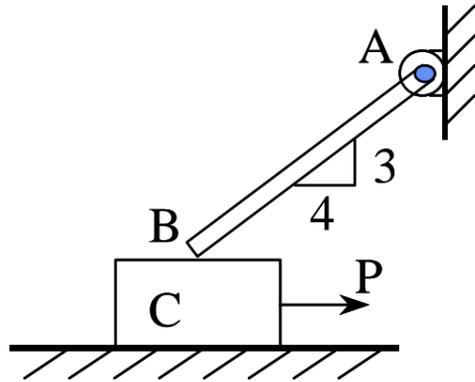

Figure 1.

2. A cantilever beam, with length of L and negligible weight, carries two concentrated loads (Figure 2).
(a) Plot the shear force and bending moment diagrams for the cantilever beam. (15%)
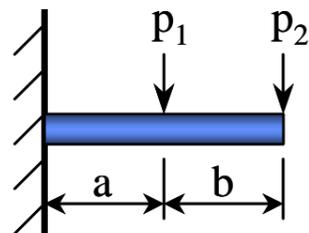(b) Determine the deflection at the free end. (10%)

Figure 2.

3. Four pins slide in four separate slots cut in a circular plate as shown in Figure 3. When the plate is at rest, each pin has a velocity directed as shown and of the same constant magnitude u. If each pin maintains the same velocity relative to the plate when the plate rotates about O with a constant counterclockwise angular velocity, w, determine the acceleration of each pin. (25%)
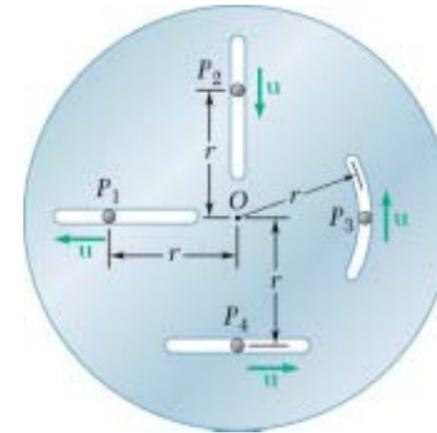

Figure 3.

4. A sphere of radius r and mass m is projected along a rough horizontal surface with the initial velocities shown in Figure 4. If the final velocity of the sphere is to be zero, express: (25%)
(a) the required magnitude of ω_o in terms of $\bar{v}_0$ and r,
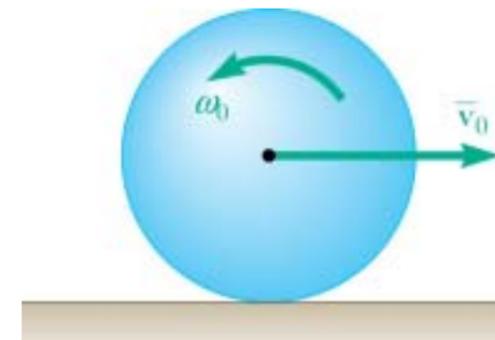(b) the time required come to rest in terms of $\bar{v}_0$ and the kinetic coefficient of friction μ_k.

Figure 4.