1. Two electrically charged pith balls, each having a mass of 0.2 g, are suspended from light threads of equal length. Determine the resultant horizontal force of repulsion, F, acting on each ball if the measured distance between them is r = 200 mm. (25%)

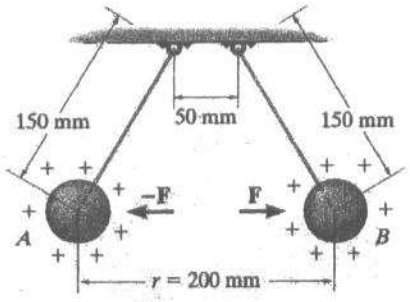

Figure 1

2. The 5-kg package is released from rest at *A*. It slides down the smooth plane which is inclined at 30°, onto the rough surface having a coefficient of kinetic friction of $\mu_k = 0.2$. Determine the total time of travel before the package stops sliding. Neglect the size of the package.

(25%)

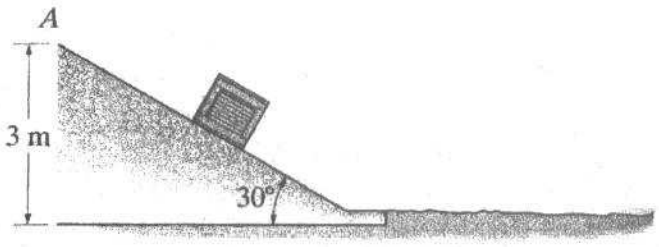

Figure 2

3. A rectangular plate of mass m and moment of inertia I_G with respect to its mass center. The plate is suspended from two pins A and B. If pin B is suddenly removed, determine
   (a) the angular acceleration of the plate,
   (b) the acceleration at mass center,
   (c) the componets of the reactions at pin A,
   immediately after pin B has been removed.
   (The acceleration of gravity is g)

(25%)

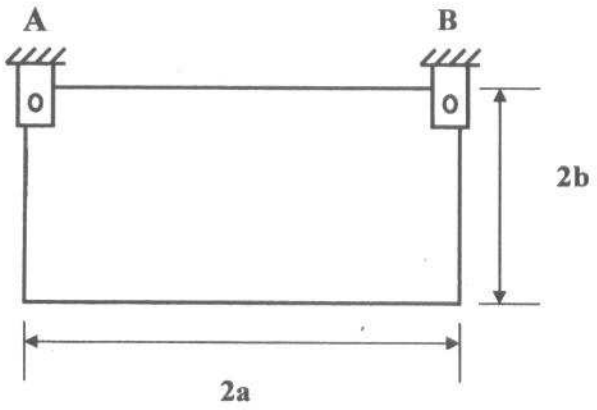

Figure 3

4. A bullet with mass m is fired with a horizontal velocity of v_b into the side of a square plate with mass M and moment of inertia I_G with respect to its mass center suspended from a hinge at A. Knowing that the panel is initially at rest, determine
   (a) the angular velocity and the velocity at mass center of the plate immediately after the bullet becomes embedded,
   (b) the impulsive reaction at hinge A, assuming that the bullet becomes embedded in time t.

(25%)

【Neglect mass of bullet after imbedded into the plate】

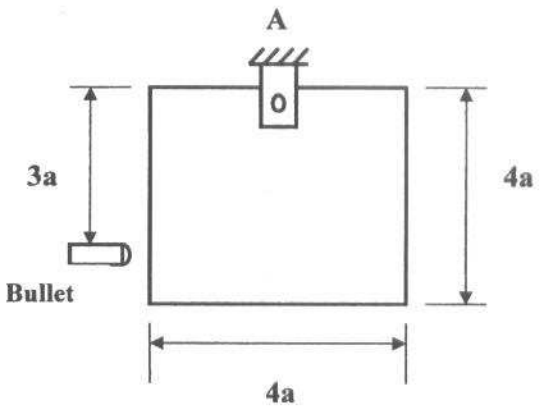

Figure 4