1. Please answer the following questions **in English**.

(1) (13%) Can we use conservation of energy in solving a collision problem of 2 particles? Explain your answer. What else principles can be used for this type of problems?

(2) (12%) What are the differences between a particle and a rigid body from the point of view of dynamics?

2. (25%) The crank **OA** revolves clockwise with a constant angular velocity of 10 red/sec within a limited arc of its motion. For the position $\theta = 30°$ determine the angular velocity of the slotted link **CB** and the acceleration of A as measured relative to the slot in **CB**.
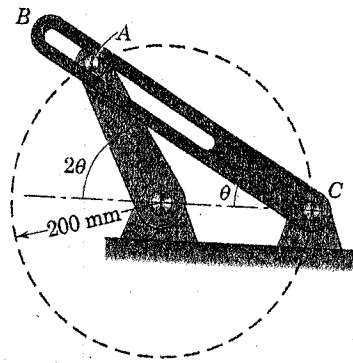
3. (25%) Determine the period τ of vertical oscillations for the system composed of the 140-kg frame and two 80-kg pulleys, each of which has a radius of gyration $\kappa_o = 400mm$. The flexible wires do not slip on the pulleys.
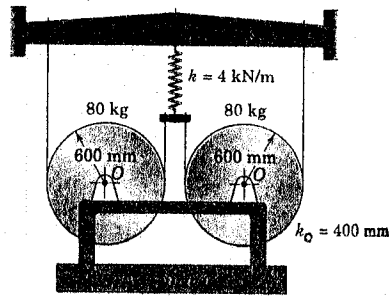
4. The ring has a mass of 10-kg, a mass center at G, and a radius of gyration $k_G=135$ mm. If its angular velocity is $\omega_1 = 2$ rad/s when it is in the position shown,

(1) (10%) first draw the free-body and kinetic diagrams completely,

(2) (15%) and then compute its angular acceleration at this instant and the normal force of the ring on the ground.

Assume that *slipping does not occur*.