1. Determine the force in members *BC*, *BF*, and *EF* of the truss as shown in Fig. 1 and state if these members are in tension or compression. Set $P_1 = 6$ kN, $P_2 = 9$ kN, $P_3 = 12$ kN. **(25%)**

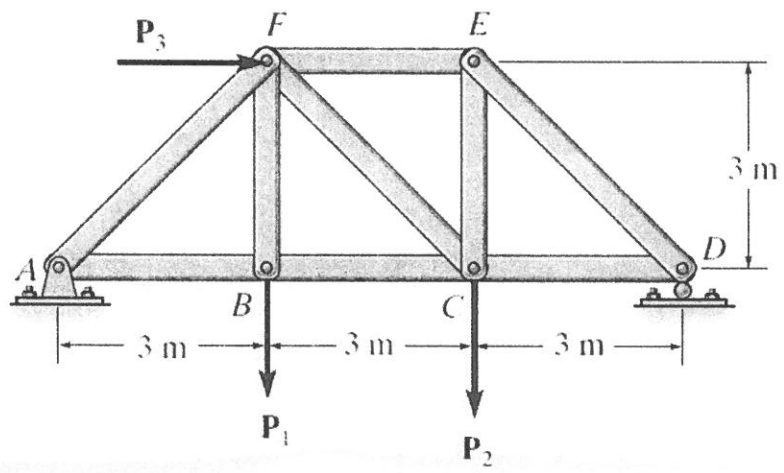

Figure 1

2. Two blocks *A* and *B*, each having a mass of 5 kg, are connected by the linkage as shown in Fig. 2. If the coefficient of static friction at the contacting surfaces is $\mu_s = 0.5$, determine the largest force *P* that can be applied to pin *C* of the linkage without causing the blocks to move. Neglect the weight of the links. **(25%)**

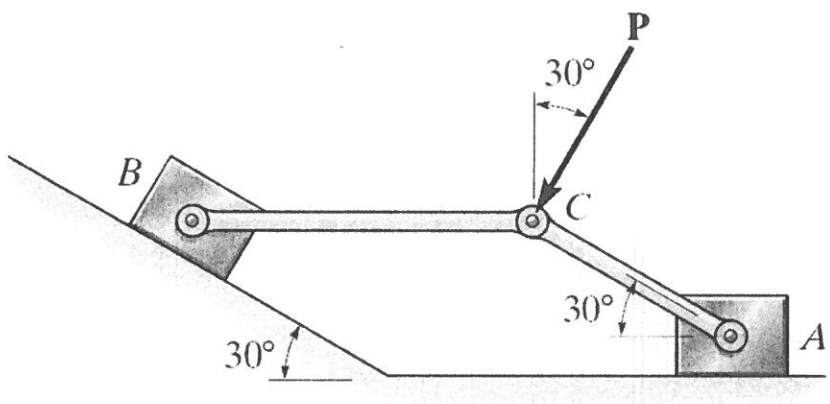

Figure 2

3. Bar AB in Fig. 3 has a counterclockwise angular velocity of 2 rad/s and a counterclockwise angular acceleration of 10 rad/s^2.
   (a) Determine the angular velocity of bar AC and the velocity of the pin A relative to the slot in bar AB. **(10%)**
   (b) Determine the angular acceleration of bar AC and the acceleration of the pin A relative to the slot in bar AB. **(10%)**

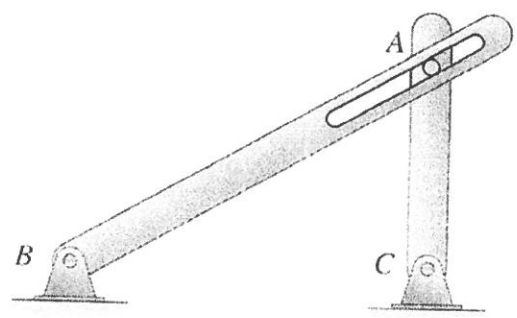

Figure 3

4. In the forging device shown in Fig. 4, the 40-kg harmer is lifted to position 1 and released form rest. It falls and strikes a workpiece when it is in position 2. The spring constant k = 1500 N/m, and the tension in each spring is 150 N when the hammer is in position 2. Neglect friction.
   (a) What is the velocity of the hammer just before it strikes the workpiece? **(10%)**
   (b) Assuming that all of the hammer's kinetic energy is transferred to the workpiece, what average power is transferred if the duration of the impact is 0.02 s? **(10%)**

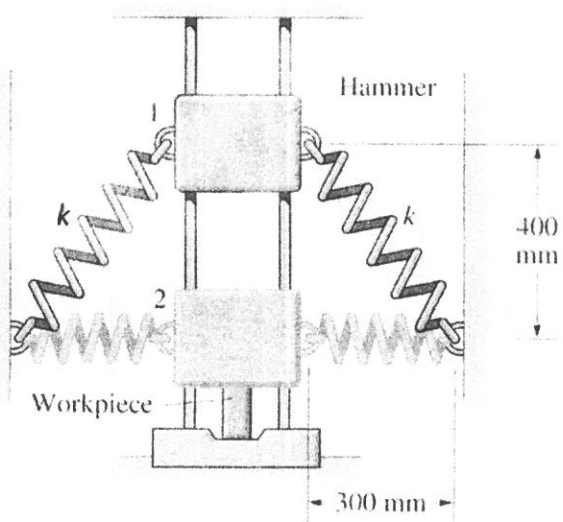

Figure 4

5. The mass m rotates around the vertical pole in a horizontal circular path as shown in Fig. 5. Determine the magnitude of its velocity in terms of θ and L. **(10%)**

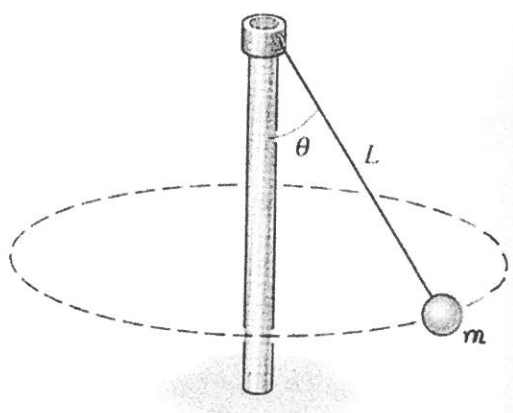

Figure 5