

- 25% 1. A jib crane with the dimensions given in figure 1 has a mass of 800 kg and a center of mass at G. The bearing A can support a horizontal force, whereas the bearing B supports both horizontal and vertical components. If the bearings A and B can sustain a maximum resultant load of 24 kN and 30 kN, respectively, determine the maximum load F that can be suspended from the end of the jib crane.
- 25% 2. In figure 2, the Weight $W = 6kN$ is hanged from the cable, which passes over the pulley at F. Neglecting the weights of the bars and the pulley, determine the magnitude of the pin reaction at D.
- 25% 3. The uniform bar and the homogeneous cylinder each have a mass of 24kg as shown in figure 3. The static coefficient of friction is μ_s at A, B, and C (the three points of contact).
 (a) Assuming equilibrium, calculate the normal and friction forces at A, B, and C.
 (b) What is the smallest value of μ_s necessary for equilibrium?
- 25% 4. Consider a uniform beam of length L and weight W sustaining horizontally by two strings as shown in figure 4, where $0 < x \leq L/2$. The moment of inertia of the beam about the center O is I_o .
 (a) Find the forces in the strings AB and CD as the beam stays in horizontal position.
 (b) What is the force in AB at the instance when string CD breaks suddenly?

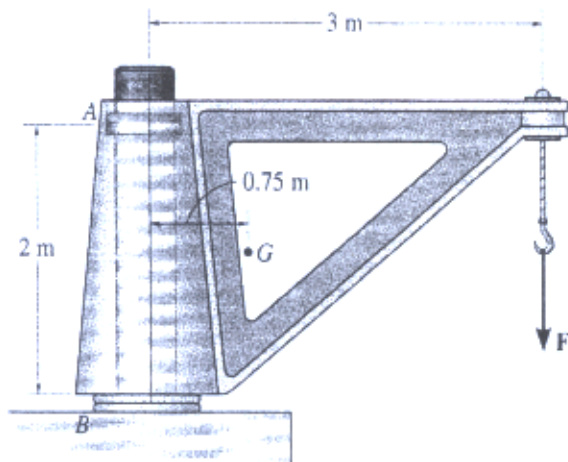


Figure 1

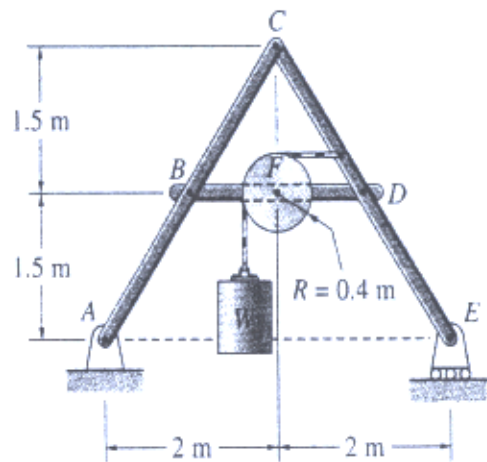


Figure 2

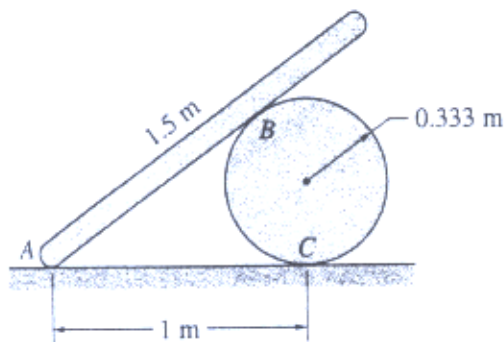


Figure 3

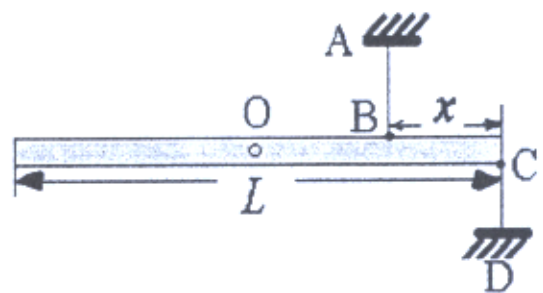


Figure 4