1. The frame in Fig.1 is used to support a 100-kg cylinder. Neglect the diameter of the pulleys at B and C, i.e. regard them as infinitesimal small pulleys and also neglect the friction of the pulleys. Determine the horizontal and vertical components of reaction at ***A*** and ***D***. (20%)

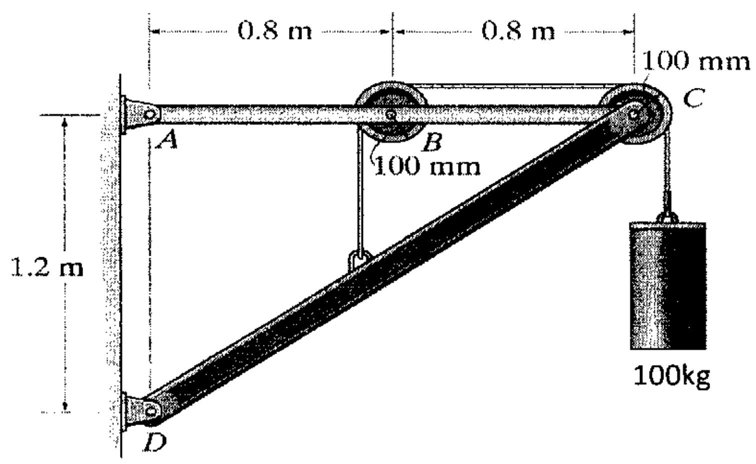

Figure 1

2. The circular disks *D* and *E* have a weight of 100 kg and 50 kg, respectively, as shown in Fig.2. Neglect friction between disks and surfaces. (20%)
   (a) Determine the normal reactions at the points of contact with the ground at *A*, *B* and *C*, if a horizontal force *P* = 100kg is applied to the center of the disk *E*.
   (b) Determine the largest horizontal force *P* that can be applied to the center of the disk *E* without causing the disk *D* to move up along the inclined surface.

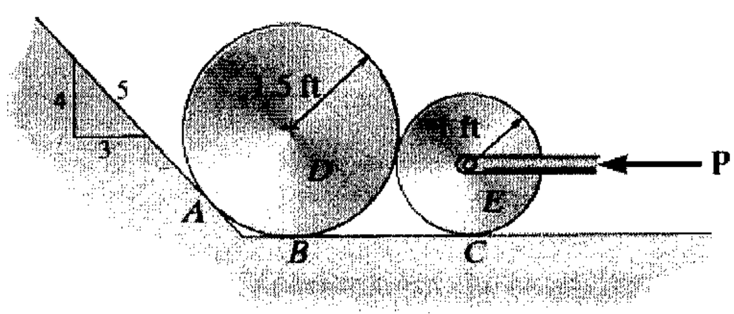

Figure 2

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第2節　

3. The 3-kg slender rod *AB* is originally at rest, suspended in the vertical position, as shown in Fig.3. A 0.5-kg ball is thrown at the rod with a velocity $v = 20$ m/s and strikes the rod at *C*. Take the coefficient of restitution e = 0.7. (20%)

(a) Determine the distance ***d*** where the rod does not create a horizontal impulse at A.

(b) Determine the angular velocity ω of the rod just after the impact.

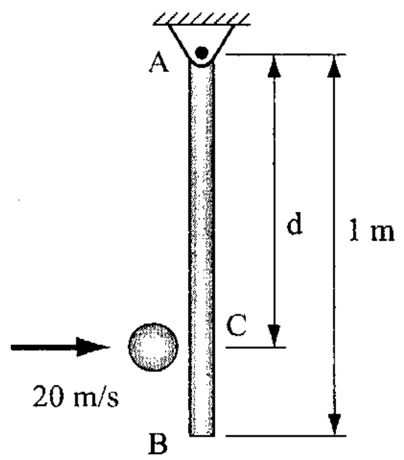

Figure 3

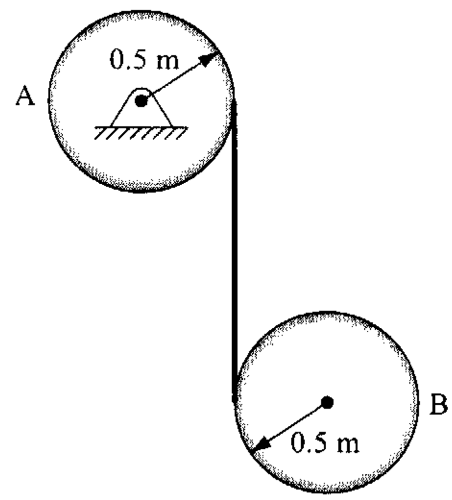

Figure 4

4. A cord is wrapped around the rim of each 10-kg disk shown in Fig.4. If disk B is released from rest, determine the angular velocity ω of disk A in 2 s. Neglect the mass of the cord. (20%)

5. The 15-kg cylinder rotates with an angular velocity of $\omega = 60$ rad/s. If a force 3 N is applied to bar AB, as shown in Fig.5, determine the time needed to stop the rotation. The coefficient of kinetic friction μ_k between AB and the cylinder is 0.3. Neglect the thickness of the bar. (20%)

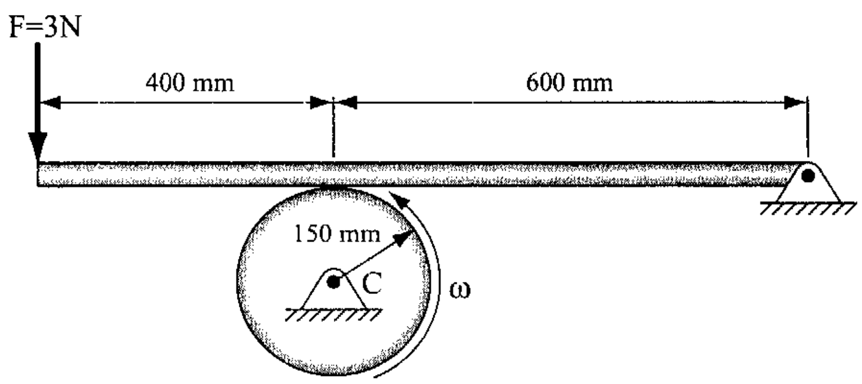

Figure 5