本試題是否可以使用計算機： ☑可使用 ， □不可使用 （請命題老師勾選）

25% 1. During a drilling operation, the small robotic device is subjected to an 800-N force at point C in figure 1. Find an equivalent force-couple system of this force at point O.

25% 2. The uniform slender rod in figure 2 is slowly lowered from the upright position ($\theta = 90°$) by means of the cord attached to its upper end and passing under the small fixed pulley. If the rod is observed to slip at its lower end when $\theta = \beta < 90°$, determine the coefficient of static friction at the horizontal surface.

25% 3. Shown in figure 3, the spring has a stiffness $k = 3$lb/ft and an unstretched length of 2ft. If it is attached to the 5-lb smooth collar and the collar is released from rest at A, determine the speed of the collar before it strikes the end of the rod at B. Neglect the size of the collar and friction on the rod.

25% 4. The uniform steel beam in figure 4 of mass m and length l is suspended by the two cables at A and B. If the cable at B suddenly breaks, determine the tension T in the cable at A immediately after the break occurs.
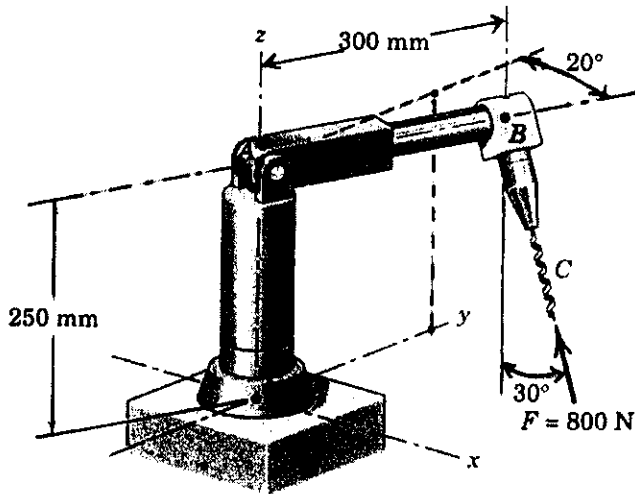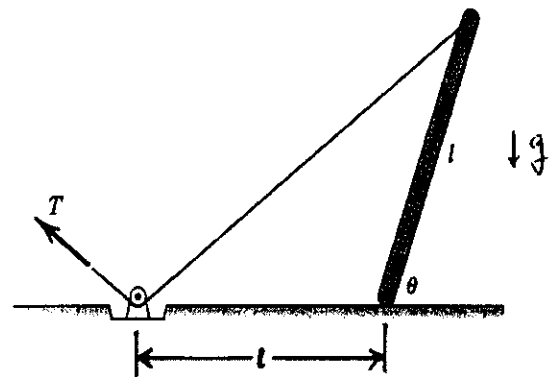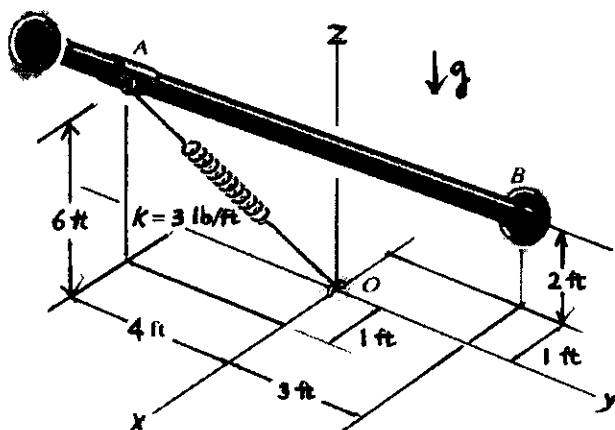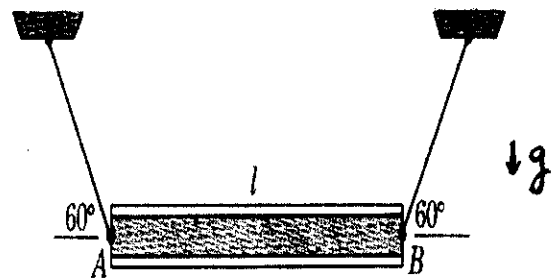

Figure 1

Figure 2

Figure 3

Figure 4