※ 考生請注意：本試題不可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. (25%)

   (a) The uniform thin rod of weight W rests against the smooth wall and floor (Figure 1a). Determine the magnitude of force **P** needed to hold it in equilibrium for a given angle θ.

   (b) Each member of the pin-connected mechanism has a mass of 4 kg. (Figure 1b) If the spring is unstretched when $\theta = 0$, determine the angle θ for equilibrium.
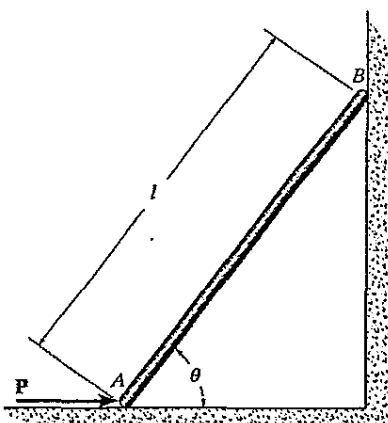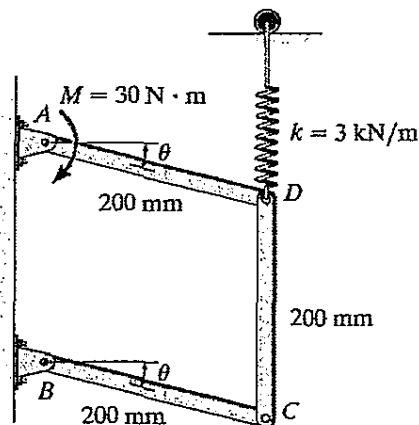

Figure 1a

Figure 1b

2. (25%) A cable is attached to the 20-kg plate B, passes over a fixed peg at C, and is attached to the block at A (Figure 2). Using the coefficients of static friction shown, determine the smallest mass of block A so that it will prevent sliding motion of B down the plane.
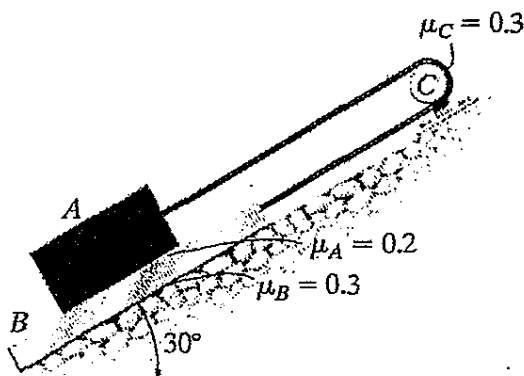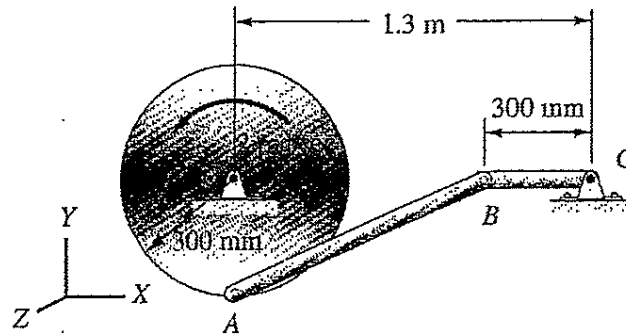

Figure 2

3. 解釋名詞 (15%)

 (a).質量　　(b).慣性　　(c).慣性定律　　(d).慣性座標系　　(e).慣性力

4. Please derive the acceleration vector in polar coordinates(r-θ). (10%)

5. In the device, find the angular velocities and angular accelerations of both bars. (10%)

6. A thin-walled cylinder held in position by a cord AB. The cylinder has a mass of 10 kg and has an outside diameter of 600 mm. What are the normal and friction forces at the contact point C at the instant that cord AB is cut? Assume that no slipping occurs. (15%)