國立臺北科技大學 100 學年度碩士班招生考試

系所組別：1511 自動化科技研究所甲組

第二節　工程力學　試題（選考）

注意事項：

1. 本試題共 4 題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

1. A concrete block A having a mass of M_A is released from rest in the position shown in Figure 1 and pulls a tree log having a mass of M_L up along a 30° slope. If the coefficient of kinetic friction between the log and slope is μ_k, please derive the velocity of the log when the block A hits the ground at B. (25%)

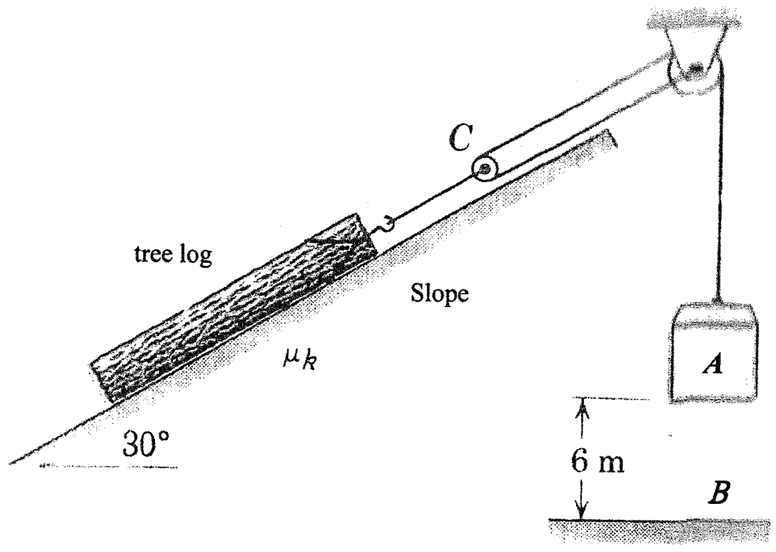

Figure 1

2. A constant force P is applied to End A of the two equivalent and uniform bars, shown in Figure 2, and causes them to move to the right in their vertical plane with a horizontal acceleration a. The horizontal line through A is chosen as the datum for zero potential energy ($V_g = 0$). Please derive the steady-state angle θ using virtual work principle. (25%)

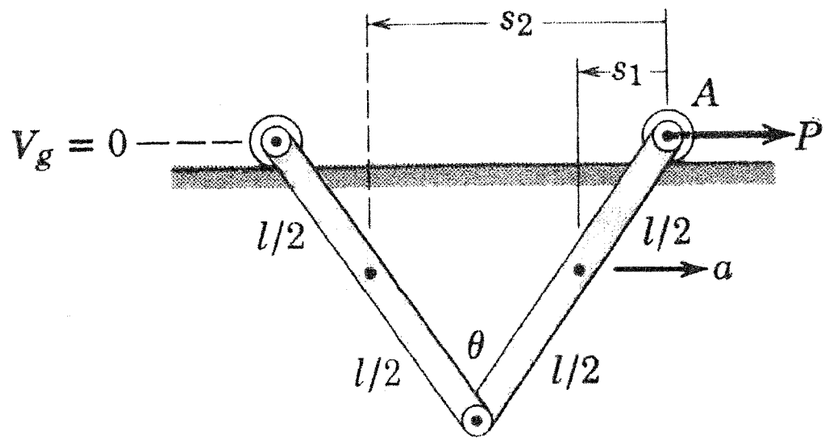

Figure 2

3. The 500-N force F is applied to the vertical pole as shown in Figure 3. Answer the following two questions:
   (1) Determine the vector and scalar components of the force vector F along x' and y' axes. (5%)
   (2) Determine the vector and scalar components of the force vector F along x and y' axes. (20%)

注意：背面尚有試題

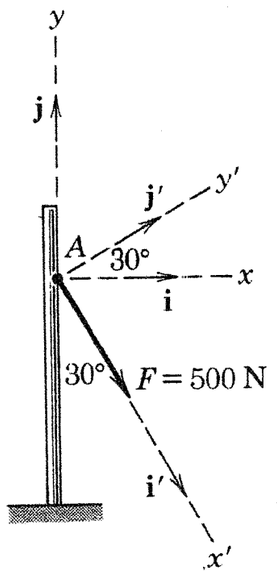

Figure 3

4. According to the loaded cantilever beam shown in Figure 4, answer the following three questions:
   (1) Draw the free-body diagram of the beam; (8%)
   (2) Determine the total road from the beam; (8%)
   (3) Determine the reaction force at the support *A* of the beam.(9%)

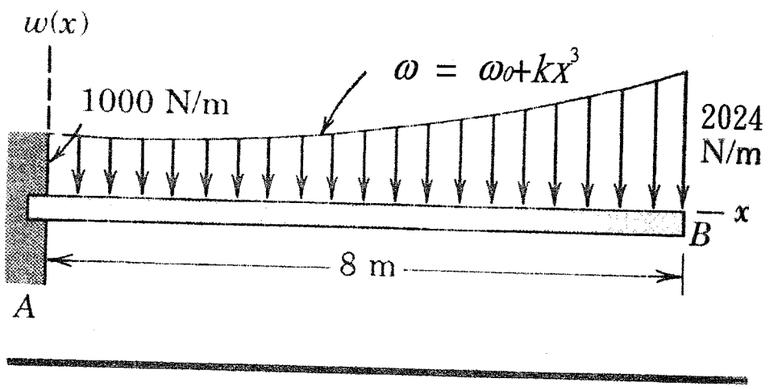

Figure 4