112ME05

國立臺北科技大學 112 學年度碩士班招生考試

系所組別：1120 機械工程系機電整合碩士班乙組

第二節　工程力學　試題

注意事項：

1. 本試題共四題，每題 25 分，共 100 分。
2. 不必抄題，作答時請將試題題號及答案依照順序寫在答案卷上。
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 400-lb weight is attached at **A** as shown in Fig. 1. The constant of the spring **BC** is k = 250 lb/in., and the spring is unstretched when $\theta = 0$. Determine the θ position of equilibrium. (25%)

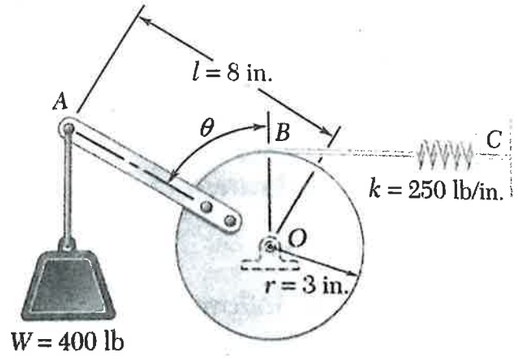

Fig. 1

2. The large window shown in Fig. 2 is opened using a hydraulic cylinder AB. If the cylinder extends at a constant rate of 0.4 m/s, determine the angular velocity and angular acceleration of the window at the instant $\theta = 45°$. (25%)

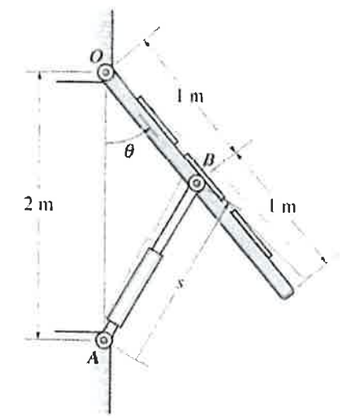

Fig. 2

3. The ram R shown in Fig. 3 has a mass 400 kg and is released from rest 0.75 m from the top of a spring, A, that has a stiffness k_A = 12 kN/m. If a second spring B, having a stiffness k_B = 15 kN/m, is nested in A, determine the maximum displacement of A needed to stop the downward motion of the ram. The unstretched length of each spring is indicated in the Fig. 3. Neglect the mass of the springs. (25%)

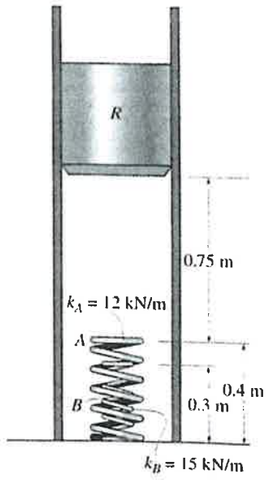

Fig. 3

注意：背面尚有試題

4. A 100-lb force acts as shown on a 300-lb block placed on an inclined plane, as shown in Fig. 4. The coefficients of static friction and kinetic friction between the block and the plane are $\mu_s = 0.3$ and $\mu_k = 0.25$, respectively. Determine whether the block is in equilibrium, and find the value of the friction force. (25%)

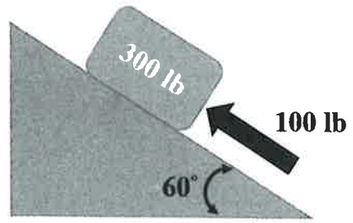

Fig. 4