編號： 159

國立成功大學 104 學年度碩士班招生考試試題

系所組別：生物醫學工程學系甲組

考試科目：工程力學

考試日期：0211，節次：1

※ 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. Define the following terms based on the perspective of engineering mechanics (15%):

(a) Rigid Body

(b) D'Alembert's Principle

(c) Conservation of Linear Momentum

(d) Couple Moment

(e) Mass Moment of Inertia

2. As shown in Figure 1, a car (mass m_1) with its engine shut off is released from rest at point A and then slides down the left side of the contoured body of mass m_2. Determine the **absolute velocities of both m_1 and m_2** at the instant of separation at point B (direction, left or right, must be indicated). Neglect friction. (18%)

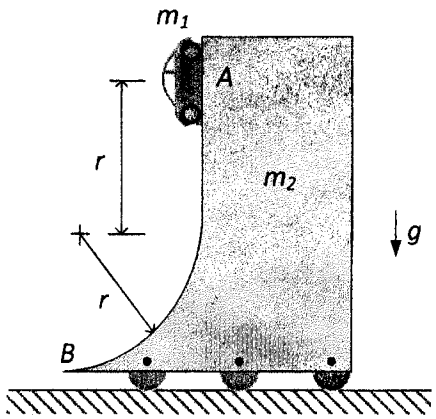

Figure 1

3. Determine the horizontal and vertical components of reaction **at pins *A* and *C*** of the two-member frame shown in Figure 2. w(x) is a uniform distributed load. (Notice: free body diagrams must be shown) (16%)

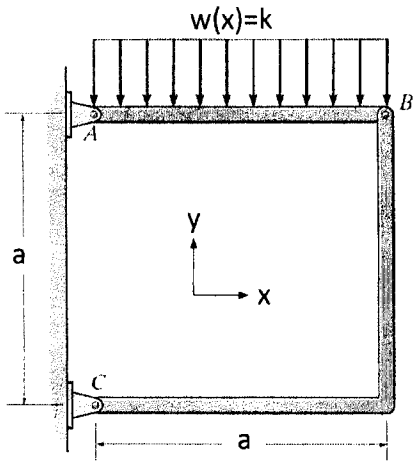

Figure 2

國立成功大學 104 學年度碩士班招生考試試題

系所組別：生物醫學工程學系甲組

考試科目：工程力學

考試日期：0211，節次：1

4. A ball is released from rest relative to the elevator at a distance h_1 above the floor (see Figure 3). The speed of the elevator at the time of ball release is v_0. Determine the bounce height h_2 of the ball **(a)** if a downward elevator velocity v_0 is constant, and **(b)** if an upward elevator acceleration $a=g/4$ begins at the instant the ball is released. The coefficient of restitution for the impact is e. (24%)

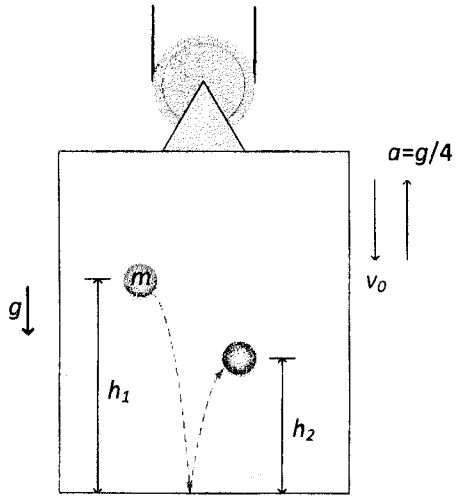

Figure 3

5. Determine the **minimum (I_{min})** and **maximum (I_{max})** moments of inertia with respect to centroidal axes through C for the composite of two rectangular areas (see Figure 4). Find the **angle α** measured from the x-axis to the axis of maximum moment of inertia. (27%)

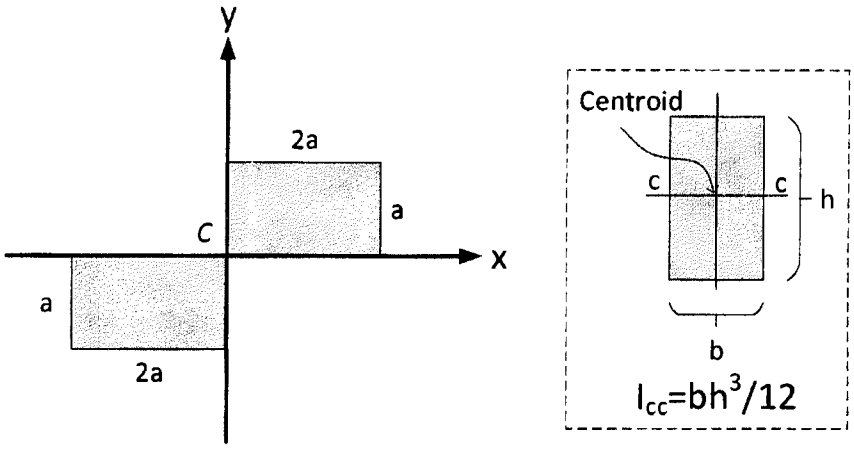

Figure 4