國立中央大學九十一學年度碩士班研究生入學試題卷

所別：機械工程學系　丁組　科目：　動力學　共 2 頁 第 1 頁

請詳細寫出計算步驟。

1. (25%) 簡答題

   a. 兩圓球斜向碰撞 (oblique central impact) 時，如果有摩擦力，會發生何種狀況？ (12%)

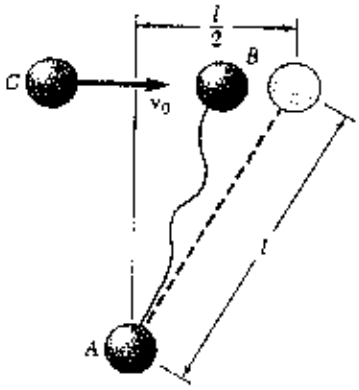
   b. 何謂離心力？ (6%)

   c. 什麼是慣性座標系統 (inertial coordinate system)，什麼時候需要用此座標？ (7%)

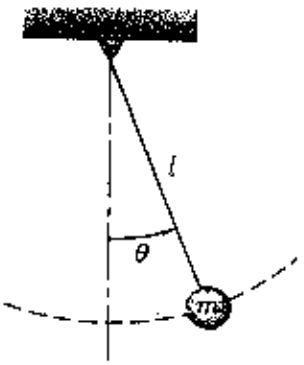
2. (25%) Three spheres, each of mass m, can slide freely on the smooth, horizontal plane. Spheres A and B are attached to an inextensible, inelastic cord of length l. Knowing that A and B are at rest and the cord is slack (鬆弛) when C (with initial velocity v_0) strikes B. Assume perfectly elastic impact between B and C.

   a. Find the velocities of three spheres immediately after the cord is taut (拉緊). (20%)

   b. Find the percentage of energy loss. (5%)



3. (25%) The bob of a simple pendulum of length $l = 800$ mm is released from rest when $\theta = 5°$. Assuming simple harmonic motion,
   a. determine 1.6 s after release the angle θ, (12%)
   b. the magnitude of the velocity and acceleration of the bob. (13%)



注意：背面有試題

4. (25%) The thin ring has a mass of ***5 kg*** and is released down the inclined plane such that it has a backspin ω=8 ***rad/sec*** and its center has a velocity v_G=***3 m/sec*** as shown. If the coefficient of friction between the ring and the plane is μ_k=0.6, determine how long (in *sec*) the ring rolls before it stops slipping. (除了寫出解題過程外，請務必以幾行文字具體說明處理此問題的原則或原理)