國立臺北科技大學 103 學年度碩士班招生考試

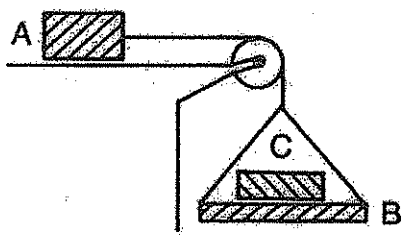
系所組別：1310 車輛工程系碩士班甲組

第二節　動力學　試題

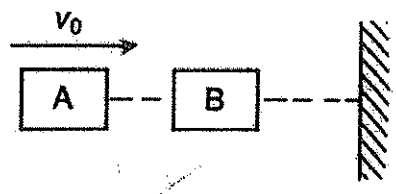
注意事項：

1. 本試題共 5 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。

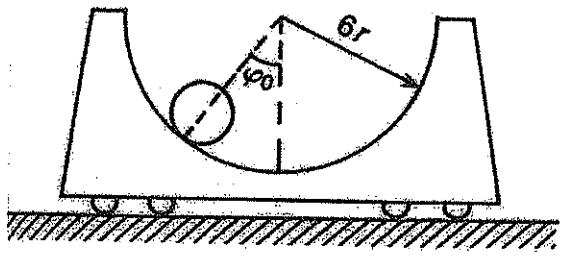
1. Body **A** is placed on a smooth horizontal surface. A cord, which is attached to **A**, passes around a frictionless pulley of negligible mass and supports bodies **B** and **C** as shown. **A**, **B** and **C** all have the same mass m. The system is released from rest. Determine the tension S and the normal force N exerted by **B** and **C**. (20%)



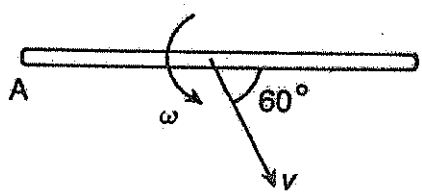
2. Two identical bodies **A** and **B** are located on a smooth floor on the same normal of a wall. **B** is initially at rest when **A** hits **B** with the velocity v_0 as shown. The coefficient of restitution is 0.7. B strikes the wall (e=0.5) and rebounds to collide with **A** again. What is the velocity of **A** after this impact? (20%)



3. A semicircular path of radius $6r$ is mounted on a cart as shown. The total mass of the cart is M. A uniform sphere of mass m and radius r may roll without slipping on the path. The cart may move freely along a horizontal surface. The system is released from rest in the position shown. What is the velocity of the cart when the sphere passes through the bottom position? (20%)



4. A bar of mass m and length L is sliding on a smooth horizontal plane with angular velocity ω and velocity v of the center of mass. In the position shown point A is suddenly fixed. Determine the corresponding loss of energy. (20%)



5. A platform of mass $5m$ may move freely along a horizontal surface. A reel of cable may roll without slipping on the platform. The reel may be modeled by uniform circular cylinder of mass m and radius r. The system is at rest when a telephone company worker of mass $2m$ suddenly applies a force P to the free end of the cable. Determine the acceleration of the platform during the subsequent motion. (20%)