

# 國立臺北科技大學

## 九十二學年度車輛工程系碩士班入學考試

### 動力學試題

填准考證號碼

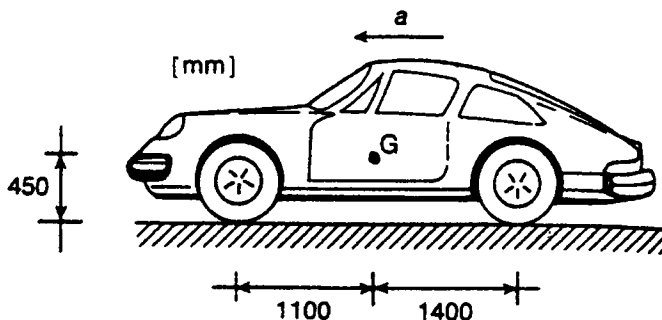
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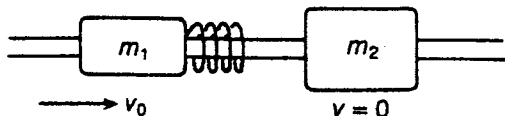
#### 注意事項：

1. 本試題共五題，配分共 100 分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在答案卷之答案欄內，否則不予計分。

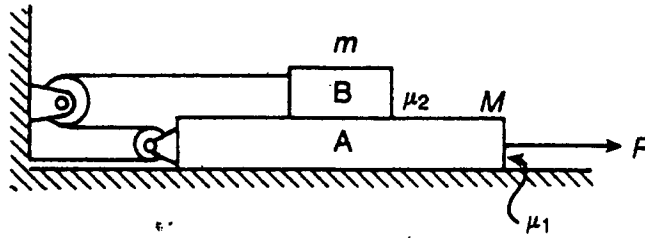
1. The center of mass of a car is located at point G as shown. The coefficient of friction between the tyres and the roadway is 0.75. What is the maximum acceleration of the car if the wheels are not to skid and the car is equipped with four-wheel drive (assume that both axles are subjected to equal torques)? (20%)



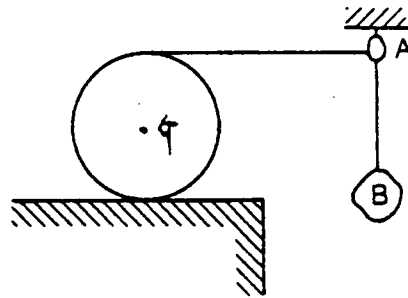
2. Two cylinders of masses  $m_1$  and  $m_2$  may slide along a smooth rod. One of the cylinders is equipped with a spring as shown. In the position shown the spring is not yet compressed. What is the maximum potential energy of the spring during the subsequent motion. (by using  $m_1$ ,  $m_2$ , and  $v_0$ ) (20%)



3. The system shown is initially at rest when a force of constant magnitude  $P$  is applied. Determine the velocity of body A when it has moved a distance  $L$ . The masses of the pulleys and the wheels may be neglected. (by using  $m, M, P, L, \mu_1, \mu_2$ , and  $g$ ) (20%)



4. A circular cylinder of mass  $m$  is placed on a horizontal plane. A body B of mass  $M$  is attached to a cord which runs through a smooth loop A and is wrapped around the cylinder. The system is released from rest. Determine the tension in the cord assuming that the cylinder is rolling without slipping. (by using  $m, M$ , and  $g$ ) Hint:  $I_G = mR^2/2$ . (20%)



5. A uniform sphere of radius  $R$  is rolling on a rough horizontal surface when it hits an obstacle in the shape of step as shown. What is the minimum allowable velocity  $v$  of the sphere if it is to get up the step? It is assumed that the sphere does not slip at the contact point P. (by using  $R$  and  $g$ ) Hint:  $I_G = 2mR^2/5$ . (20%)

