

# 國立臺北科技大學九十九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

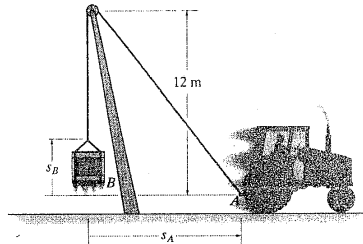
## 第一節 動力學 試題

第一頁 共一頁

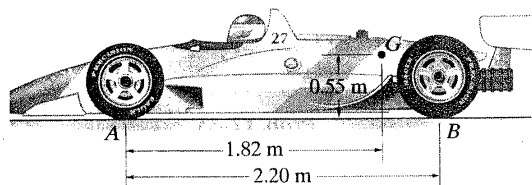
### 注意事項：

1. 本試題共【5】題，每題【20】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. A tractor is used to lift the 150 kg load B with a 24 m-long rope. When  $s_A = 0$ ,  $s_B = 0$ . If the tractor is moving to the right with a constant velocity  $v = 4 \text{ m/s}$  at the instant when distance  $s_A = 5 \text{ m}$ . Determine the acceleration of load B and the tension in the rope at this instant.



2. Determine the greatest possible acceleration of the 1000 kg race car so that the tires don't slip on the track and its front tires don't leave the ground. The coefficients of static and kinetic friction are  $\mu_s = 0.8$  and  $\mu_k = 0.6$ . The car has rear-wheel drive and the front tires are free to roll. Neglect the mass of the tires.



3. A elevator E and its freight have a total mass of 500 kg. Hoisting is assembled by a motor M and a 80 kg counterweight C. If the motor has an efficiency 0.8, determine the power that must be supplied to the motor when the elevator is hoisted upward with a constant speed of  $v_E = 6 \text{ m/s}$

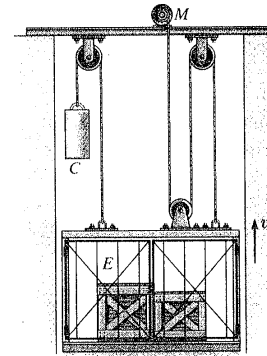


Figure for problem 3

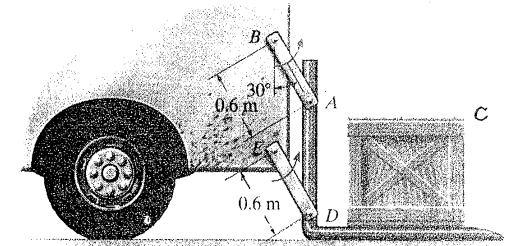


Figure for problem 4

4. The crate C has a mass of 100 kg and rests on the truck lift for which the coefficient of static friction is  $\mu_s = 0.4$ . Determine the largest initial angular acceleration  $\alpha$  of links AB and DE, starting from rest, which the parallel links AB and DE that won't cause the crate to slip.
5. Two cars with the same mass move head-on each other at location C. After the collision, both cars skid with the brakes locked and come to stop in the position as shown. If the speed of car A just before collision was 6 km/h and the kinetic friction coefficient between the tires and the pavement of both cars is 0.4. Determine the speed of car B just before collision and the coefficient of restitution between two cars.

