

# 國立臺北科技大學 102 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

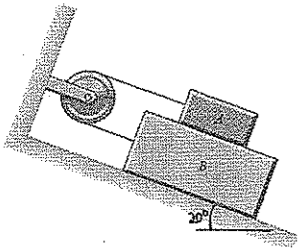
## 第一節 動力學 試題

第一頁 共一頁

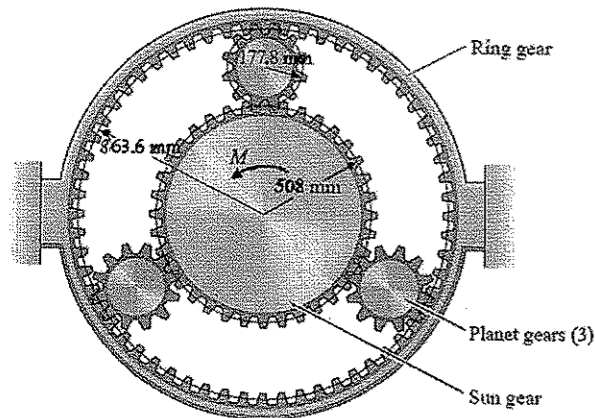
### 注意事項：

1. 本試題共 5 題，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。

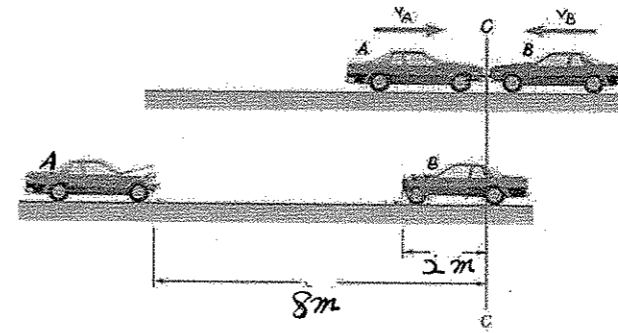
1. The mass of block A is 10 kg, and that of block B is 40 kg. The coefficient of kinetic friction between all surfaces is 0.11. Determine the acceleration of block B on the 20 degree included surface. (20%)



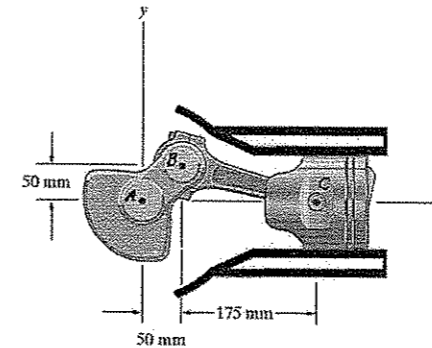
2. The ring gear is fixed. The mass and moment of inertia of the sun gear are  $m_s = 321 \text{ kg}$  and  $I_s = 5962 \text{ kg}\cdot\text{m}^2$ . The mass and moment of inertia of each planet gear are  $m_p = 39.4 \text{ kg}$  and  $I_p = 88.1 \text{ kg}\cdot\text{m}^2$ . The radius of ring gear is 863.6 mm, the radius of sun gear is 508 mm, and the radius of planet gear is 177.8 mm. A couple  $M = 800 \text{ N}\cdot\text{m}$  is applied to the sun gear. Use work and energy to determine the angular velocity of the sun gear after it has turned 10 revolutions. (20%)



3. In an accident, two cars of the same mass run head-on into each other at C. After the collision, the cars skid with their brakes locked and come to a stop in the positions shown in the lower part of the figure. The speed of car A just before impact was 8 km/h, and the coefficient of kinetic friction between the road surface and the tires of both cars is 0.30. Determine  
(a) the speed of car B just before impact, (10%)  
(b) the effective coefficient of restitution between the two cars. (10%)



4. The following figure shows a single engine cylinder. At the instant shown, the piston's velocity is  $v_c = -14i \text{ m/s}$ . Determine the angular velocities of the crank AB and the connecting rod BC. (20%)



5. Each of the go-cart's front wheels weights 22.2 N and has a moment of inertia of  $0.014 \text{ kg}\cdot\text{m}^2$ . Each of the rear wheels weights 89 N and has a moment of inertia of  $0.068 \text{ kg}\cdot\text{m}^2$ . The total weight of the go-cart, including wheels, and driver is 1067 N. The location of the center of mass of the go-cart and driver, not including the wheels, is shown in the figure. The torque acting on the rear wheels is 16.3 N·m. Determine the go-cart's acceleration. (20%)

