

國立臺北科技大學

九十三年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

第一頁 共一頁

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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。

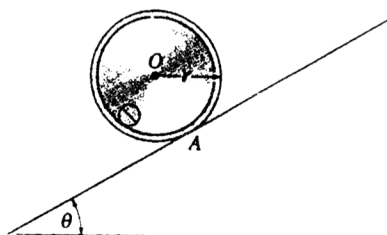
1. The sport car, $m=1800\text{kg}$, is traveling horizontally along a 20° banked track which is circular and has a radius of curvature $\rho=100\text{m}$. If the coefficient of static friction between tires and road is $\mu_s=0.2$, determine the maximum and minimum constant speed at which the car can travel without sliding up or down the slope. Neglect the size of the car.

(20%)



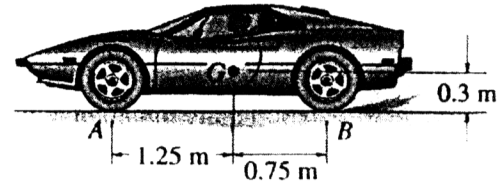
2. The drum has a mass of 70 kg, a radius of 300 mm, and radius of gyration $k_o = 125\text{mm}$. If the coefficients of static and kinetic friction at A are $\mu_s = 0.4$ and $\mu_k=0.3$, respectively, determine the drum's angular velocity 2 seconds after it is released from rest. Take $\theta = 30^\circ$.

(20%)



3. A car has a mass of 1.5 Mg and a center of mass at G. Determine the car's acceleration if the "driving" wheels in the back are always slipping, whereas the front wheels freely rotate. Also determine the time it needs from rest to reach the velocity equal 40km/hr. Neglect the mass of the wheels. The coefficient of kinetic friction between the wheels and the road is $\mu_k=0.25$.

(20 %)



4. Two cars A and B, each having a mass of 1500kg, collide on the icy pavement of an intersection. The direction of motion of each car after collision is measured from snow tracks as shown. If the driver in car A states that he was going 45km/hr just before collision and that after collision he applied the brakes so that his car skidded 3m before stopping, determine the approximate speed of car B just before the collision. Assume that the coefficient of kinetic friction between the car wheels and the pavement is $\mu_k=0.15$.

(20 %)

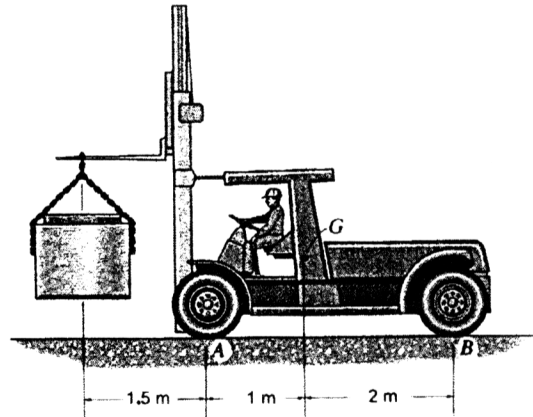
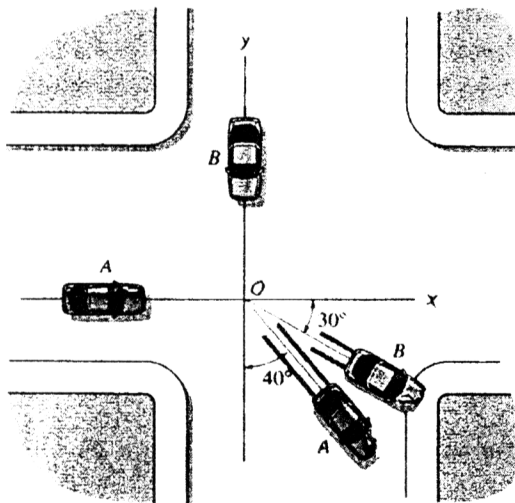


Fig. 5

5. The forklift and operator have a combined mass of 5000 kg and center of mass at G (see Fig. 5). If the forklift is used to lift the 1000 kg concrete pipe,
- (1) Determine the normal reactions on each of its four wheels if the pipe is given an upward acceleration of 2 m/s^2 .
 - (2) Determine the maximum vertical acceleration it can give to the pipe so that it does not tip forward on its front wheels.

(20 %)