

國立臺北科技大學 101 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 truck carries the spool which has a mass of 100 kg and a radius of gyration of $r_G = 0.6$ m. Determine the angular acceleration of the spool if it is not tied up on the truck when the truck begins to accelerate at 1.5 m/s^2 . The coefficients of static and kinetic friction between the spool and the truck are $\mu_s = 0.2$ and $\mu_k = 0.15$, respectively.

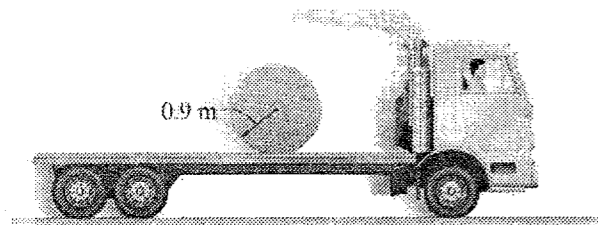


Figure for Problem 1

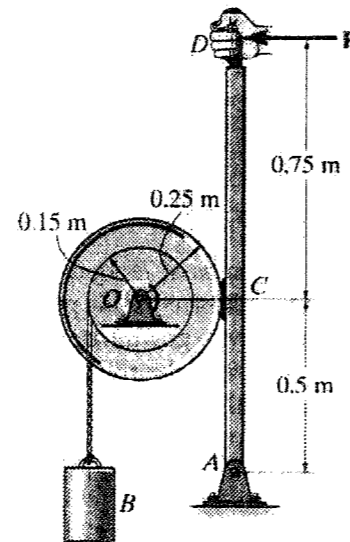


Figure for Problem 2

2. The drum has a mass of 50 kg and a radius of gyration about the pin at O of $r_O = 0.25$ m. If the 15-kg block is moving downward at 2 m/s and a force of $P = 100 \text{ N}$ is applied to the brake arm, determine how far the block descends from the instant the brake is applied until it stops. The coefficient of kinetic friction at the brake pad is $\mu_k = 0.5$.

3. Determine the maximum acceleration that can be achieved by the 775-kg race car without having the front wheels A leave the track or the rear drive wheels B slip on the track. The coefficients of static and kinetic friction of the track are $\mu_s = 0.9$ and $\mu_k = 0.7$, respectively. The car's mass center is at G , and the front wheels are free to roll.

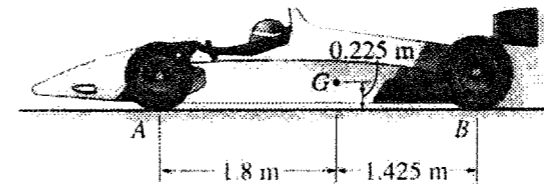


Figure for Problem 3

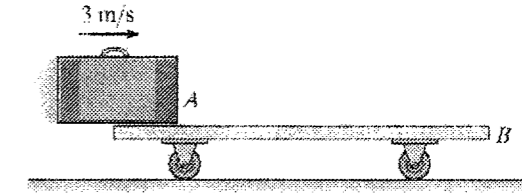


Figure for Problem 4

4. The 10-kg cart B is supported on rollers of negligible size. If a 5-kg suitcase A is thrown horizontally on to the cart at 3 m/s when it is at rest, determine the time t and the distance B moves at the instant A stops relative to B . The coefficients of kinetic friction between A and B is $\mu_k = 0.2$.
5. A 60-kg skier starts from rest at A . Determine his speed at B and the distance s where he lands at C .

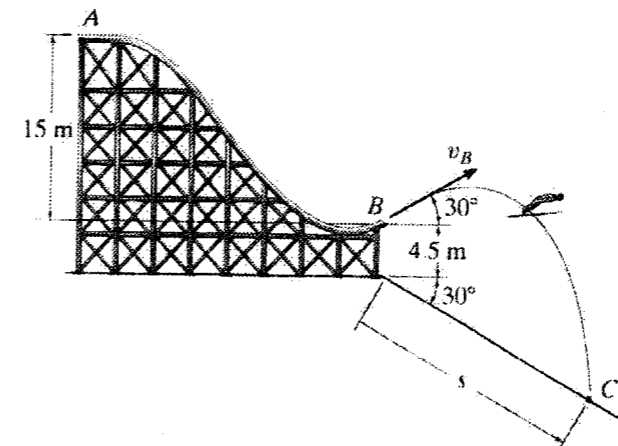


Figure for Problem 5