109VE02

國立臺北科技大學 109 學年度碩士班招生考試

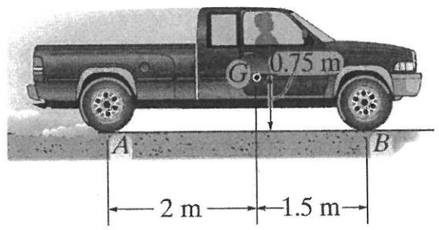
系所組別：1301 車輛工程系碩士班

第二節　動力學　試題（選考）

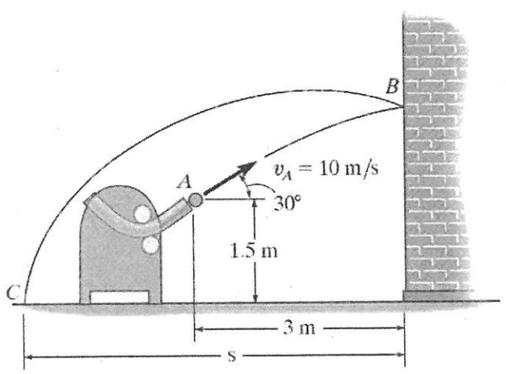
注意事項：

1. 本試題共 5 題，每題 20 分，共 100 分。
2. 不必抄題，作答時請將試題題號及答案依照順序寫在答案卷上。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

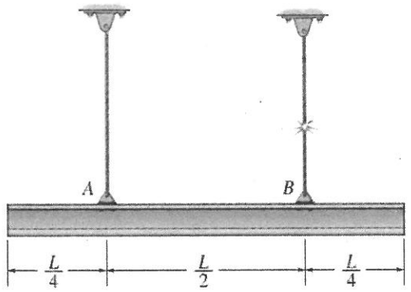
1. The 2-Mg truck achieves a speed of 15 m/s with a constant acceleration after it has traveled a distance of 100 m, starting from rest. Determine the normal force exerted on each pair of front wheels B and rear driving wheels A. Also, find the traction force on the pair of wheels at A. The front wheels are free to roll. Neglect the mass of the wheels. (20%)



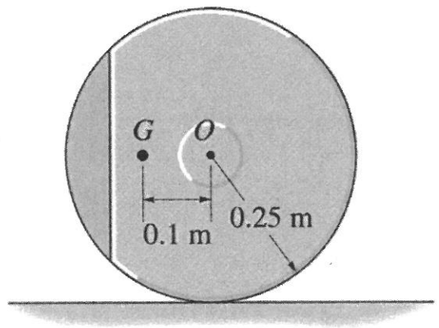
2. A pitching machine throws the 0.5-kg ball toward the wall with an initial velocity v_A=10m/s as shown. Determine (a) the velocity at which it strikes the wall at B, (b) the velocity at which it rebounds from the wall if the coefficient of restitution $e = 0.5$, and (c) the distance s from the wall to where it strikes the ground at C. (20%)



3. The uniform beam has a weight W. If it is originally at rest while being supported at A and B by cables. Determine the tension in cable A if cable B suddenly fails. Assume the beam is a slender rod. (20%)



4. The 30-kg wheel has a mass center at G and a radius of gyration $k_G = 0.15$ m. If the wheel is originally at rest and released from the position shown, determine its angular acceleration. The coefficients of static and kinetic friction between the wheel and the surface are $\mu_s = 0.2$ and $\mu_k = 0.15$ respectively. (20%)



5. The system consists of a 20 kg disk A, a 2-kg slender rod BC and a 1 kg smooth collar C. If the disk rolls without slipping, determine the velocity of the collar and the angular velocity of the rod at the instant $\theta = 0°$. The system is released from rest when $\theta = 45°$. (20%)