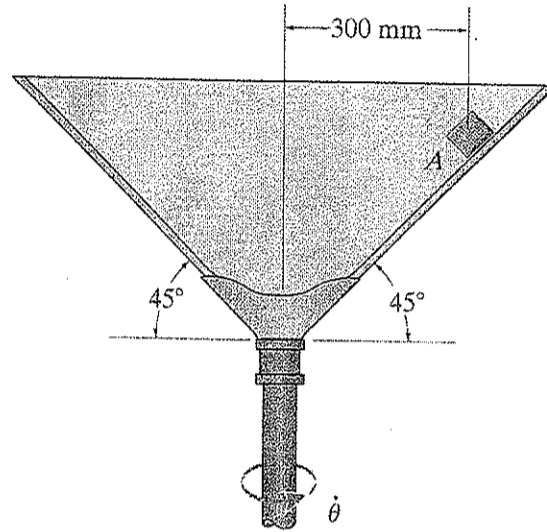


國立臺灣科技大學101學年度碩士班招生試題

系所組別： 自動化及控制研究所碩士班甲組
 科 目： 動力學

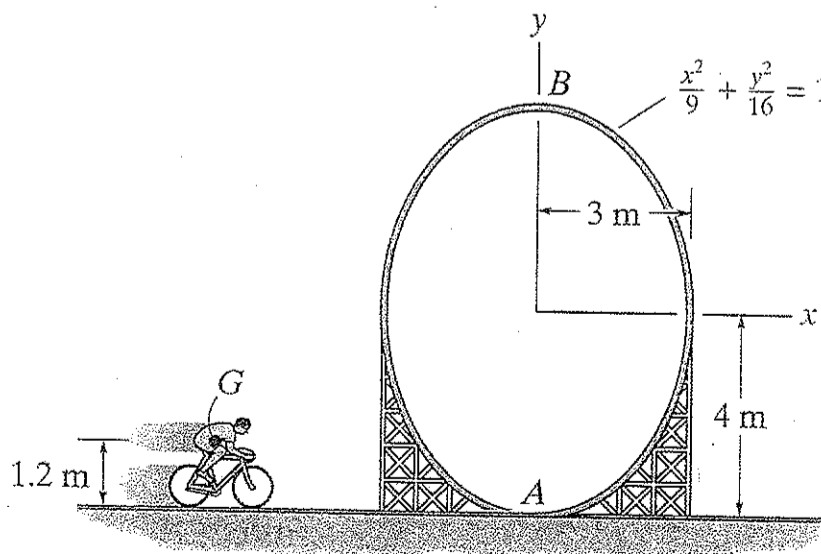
(總分為100分)

1. If the coefficient of static friction between the conical surface and the block is $\mu_s = 0.2$, determine the maximum constant angular velocity $\dot{\theta}$ without causing the block to slide upwards. (10%)

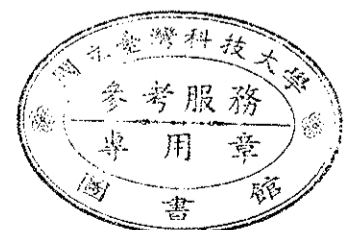


Problem 1

2. The man on the bicycle attempts to coast around the ellipsoidal loop without falling off the track. The bicycle and man have a total mass of 85 kg and a center of mass at G . Neglect the mass of the wheels. Determine the speed he must maintain at A just before entering the loop in order to perform the stunt. (20%)



Problem 2



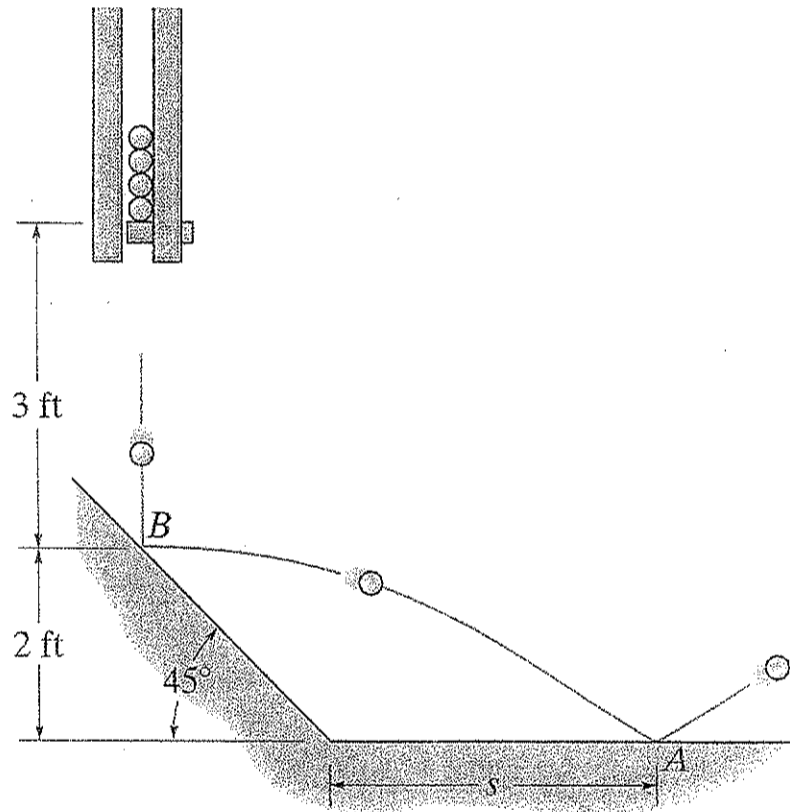
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系所組別： 自動化及控制研究所碩士班甲組

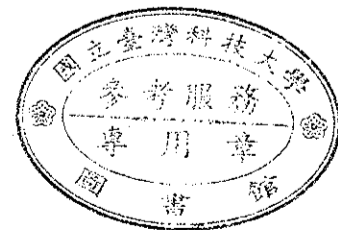
科 目： 動力學

(總分為100分)

3. To test the manufactured properties of 2-lb steel balls, each ball is released from rest as shown and strikes the 45° smooth inclined surface. If the coefficient of restitution is to be $e = 0.8$, determine
- (a) The distance s to where the ball strikes the horizontal plane at A . (10%)
- (b) At what speed does the ball strike point A ? (10%)



Problem 3



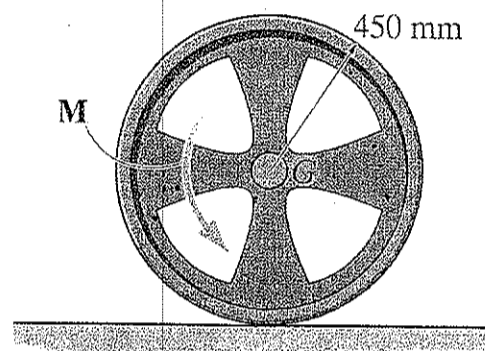
國立臺灣科技大學101學年度碩士班招生試題

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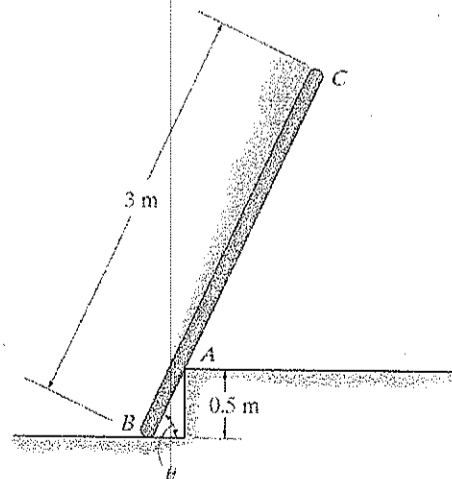
(總分為100分)

4. The 75-kg wheel has a radius of gyration about its mass center of $k_G = 375$ mm. The coefficients of static and kinetic friction between the wheel and the ground are $\mu_s = 0.2$ and $\mu_k = 0.15$, respectively.
- (a) Determine its angular acceleration if it is subjected to a torque of $M = 100$ N·m. (10%)
- (b) Repeat part (a) but $M = 150$ N·m. (10%)

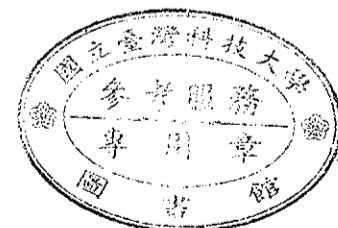


Problem 4

5. The uniform pole has a mass of 15 kg and falls from rest when $\theta = 90^\circ$. It strikes the edge at A when $\theta = 60^\circ$. If the pole then begins to pivot about this point after contact, determine the pole's angular velocity just after the impact. Assume that the pole does not slip at B as it falls until it strikes A . (10%)



Problem 5



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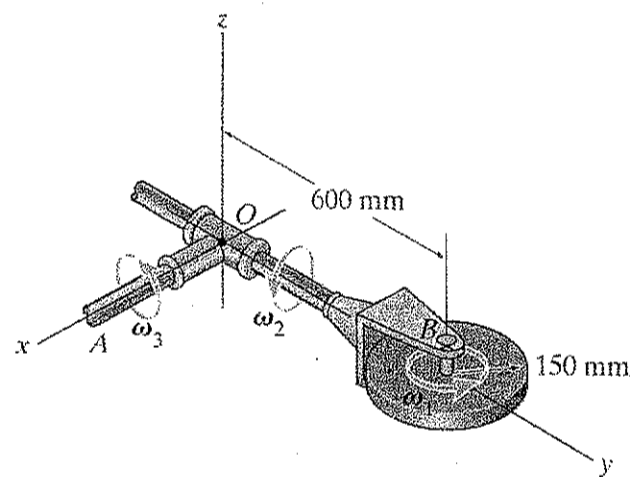
科 目： 動力學

(總分為100分)

6. The 10-kg circular disk spins about its axle with a constant angular velocity of $\omega_1 = 15$ rad/sec. Simultaneously, arm OB and shaft OA rotate about their axes with constant angular velocities of $\omega_2 = 0$ and $\omega_3 = 6$ rad/sec, respectively.

(a) Determine the angular momentum of the disk about point O , and its kinetic energy. (10%)

(b) Repeat part (a) but $\omega_2 = 10$ rad/sec. (10%)



Problem 6

