

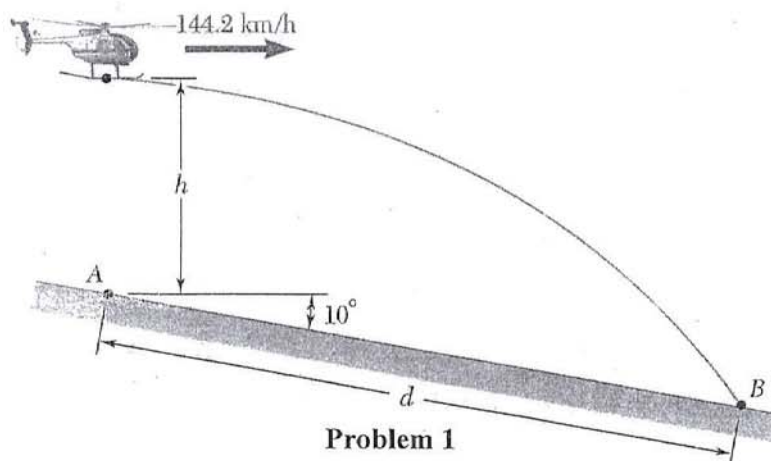
國立臺灣科技大學102學年度碩士班招生試題

系所組別： 自動化及控制研究所碩士班甲組

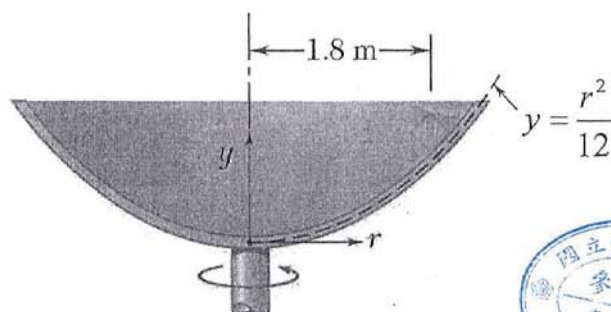
科 目： 動力學

(總分為100分)

1. A helicopter is flying with a constant horizontal velocity of 144.2 km/h and is directly above point A when a loose part begins to fall. The part lands 6.5 s later at point B on an inclined surface, determine
- (a) The distance d between points A and B . (10%)
- (b) The initial height h . (10%)



2. A 2.7 kg block is at rest relative to a parabolic dish which rotates at a constant rate about a vertical axis. Knowing that the coefficient of static friction is 0.5 and that $r = 1.8$ m, determine the maximum allowable speed v of the block. (10%)

**Problem 2**

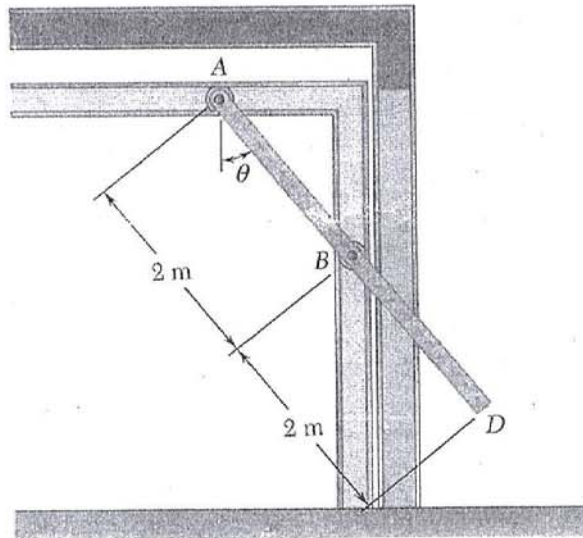
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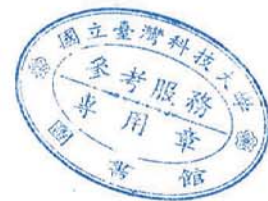
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(總分為100分)

3. An overhead door is guided by wheels at A and B that roll in horizontal and vertical tracks. Knowing that when $\theta = 40^\circ$ the velocity of wheel B is 0.6 m/s upward, determine
- (a) The angular velocity of the door. (10%)
- (b) The velocity of end D of the door. (10%)



Problem 3



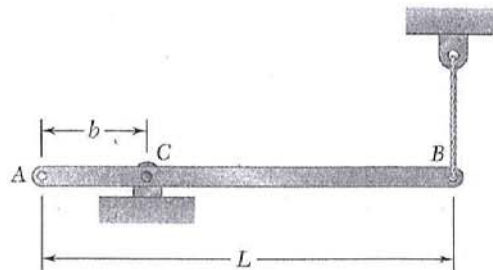
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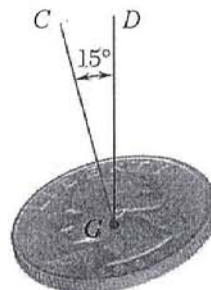
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4. A uniform rod of length L and mass m is supported as shown. If the cable attached at B suddenly breaks, determine
- (a) The distance b for which the acceleration of end A is maximum. (10%)
- (b) The corresponding acceleration of end A and the reaction at C . (10%)



Problem 4

5. A coin is tossed into the air. It is observed to spin at the rate of 600 rpm about an axis GC perpendicular to the coin and to precess about the vertical direction GD , where point G is the center of mass. Knowing that GC forms an angle of 15° with GD , determine
- (a) The angle that the angular velocity ω of the coin forms with GD . (10%)
- (b) The rate of precession of the coin about GD . (10%)



Problem 5



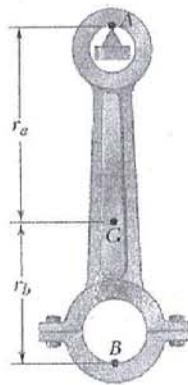
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6. The period of small oscillations about A of a connecting rod is observed to be 1.03 sec. Knowing that the distance $r_a = 160$ mm, determine the centroidal radius of gyration of the connecting rod. Point G is the center of mass. (10%)



Problem 6

