※ 考生請注意：本試題可使用計算機，並限「考選部核定之國家考試電子計算器」機型

1. (25%) 請將以下中文翻譯成英文。

   (1) 動摩擦力由垂直於接觸面的力和動摩擦係數決定，它與相對滑動速度和接觸面積無關。

   (2) 機械利益定義為輸出力對輸入力的比值，用來衡量力量放大的能力。

2. (25%) A uniformly loaded square crate is released from rest with its corner D directly above A; it rotates about A until its corner B strikes the floor, and then rotates about B. The floor is sufficiently rough to prevent slipping and the impact at B is perfectly <u>plastic</u>. Let m be the mass of the crate with center at G and c be the length of an edge (moment of inertia $I = mc^2/6$). Denoting by ω_0 the angular velocity of the crate immediately <u>before</u> B strikes the floor, determine (a) the angular velocity of the crate immediately <u>after</u> B strikes the floor, (b) the percentage of the kinetic energy of the crate lost during the impact, (c) the angle θ through which the crate will rotate after B strikes the floor.
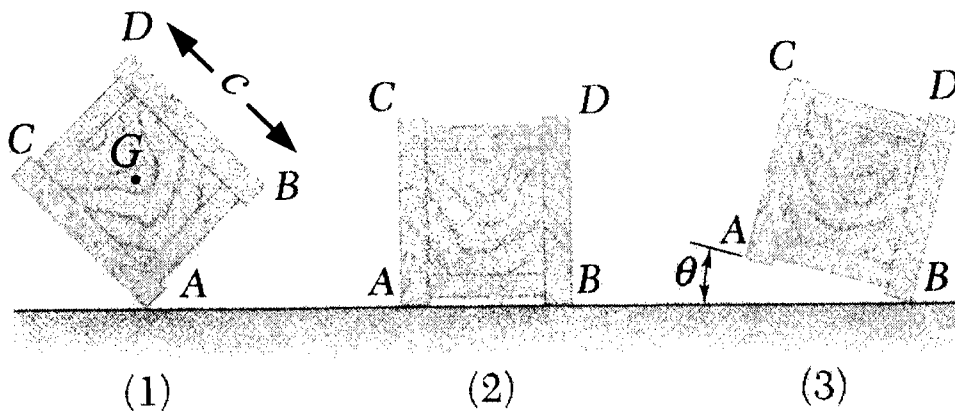

Figure of Problem 2

系所組別： 機械工程學系丙組

考試科目： 動力學及專業英文

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3. [25%] If a ball has a weight W and radius r and is thrown onto a rough horizontal surface with a mass center velocity V_G parallel to the surface, determine the backspin, ω, it must be given so that it stops spinning at the same instant that its forward velocity is zero. The coefficient of kinetic friction between the rough surface and the ball is μ.

4. [25%] The gear has a mass of 2 kg, a pitch radius of 0.2 m, and a radius of gyration $k_A = 0.15$ m. The connecting link AB (slender rod) and slider block at B have a mass of 4 kg and 1 kg, respectively. If the gear has an angular velocity $\omega = 8$ rad/s and the slider block rests at the instant $\theta = 45°$, determine the gear's angular velocity when $\theta = 0°$.