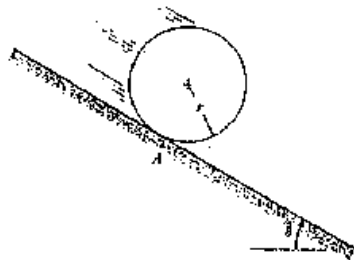1. 簡答題：

(a) (14 %) 請解釋以下的兩個專有名詞：

(1) KINETICS

(2) KINEMATICS

(b) (11 %) 什麼是慣性座標系(inertial coordinate system)，此座標系在動

力學的重要性為何？

2. (25 %) The ball of mass m and radius r rolls along an inclined plane for which the coefficient of static friction is μ. If the ball is released form rest, determine the maximum angle θ for the incline so that it rolls without slipping at A.

3. (25 %)

The mechanism produces intermittent motion of link *AB*. If the sprocket *S* is turning with an angular acceleration α_s = 2 rad/s^2 and has an angular velocity ω_s = 6 rad/s at the instant shown, determine the angular velocity and angular acceleration of link *AB* and *BC*, respectively, at this instant. The sprocket *S* is mounted on a shaft which is separate from a collinear shaft attached to *AB* at *A*. The pin at *C* is attached to one of the chain links such that it moves vertically downward.
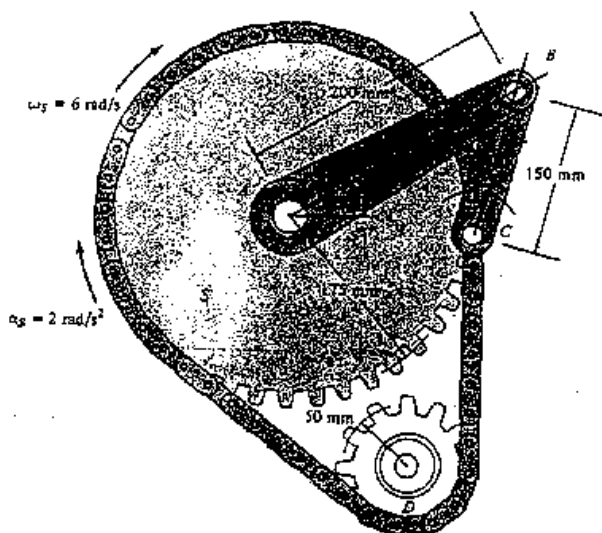
4. (25 %)

A homogeneous circular cylinder which rolls without slipping. If the cylinder mass is 100 kg, the cylinder radius 0.5 m, the spring constant 75 N/m, and the damping coefficient 10 N-s/m, determine (a) the damping ratio, and (b) the damped natural frequency of this system.