系　　所：系統及船舶機電工程學系

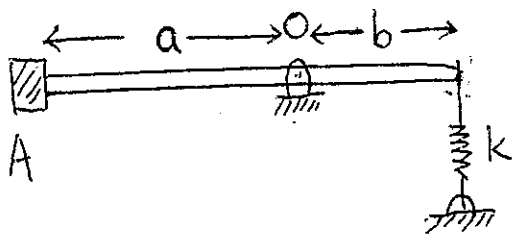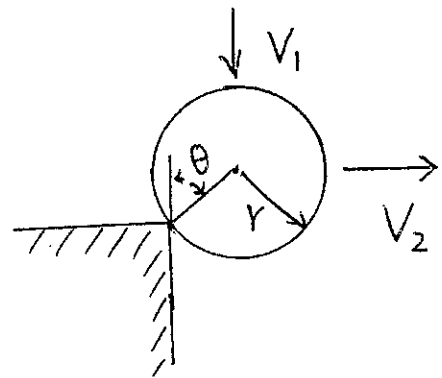考試科目：動力學　　　　　　　　　　　　　　　考試日期：0227，節次：2

第1頁，共3頁

※ 考生請注意：本試題不可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

I. The block has a mass m and is supported by a
(20%) rigid bar of negligible mass. If the spring has a stiffness k, determine the natural period of vibration for the block.
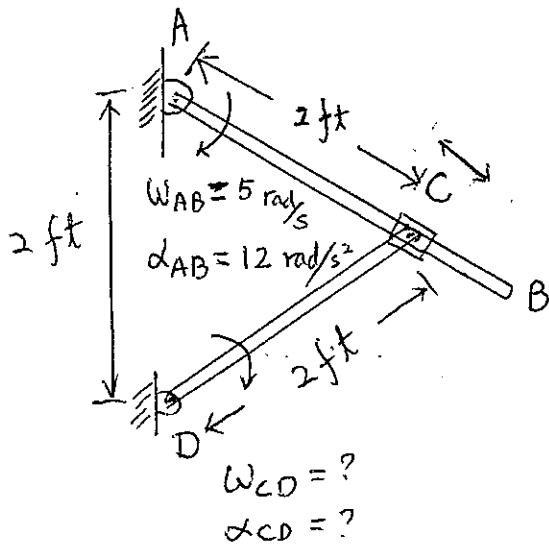

Prob. I　　　　　　　　　　　　　Prob. II

II. The solid ball of mass is dropping with a velocity
(20%) V_1 onto the edge of the rough step. If it rebounds horizontally off the step with a velocity V_2, determine the angle θ at which contact occurs. Assume no slipping when the ball strikes the step. The coefficient of restitution is e.
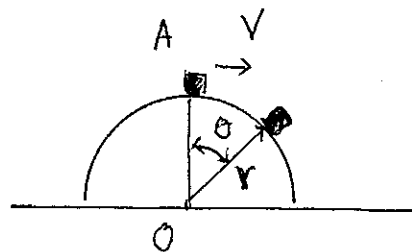
※ 考生請注意：本試題不可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

III. At a given instant, rod AB has the angular motions shown.
(20%) Determine the angular velocity and angular acceleration of rod CD at this instant. There is a collar at C.

Prob. III.

$\omega_{AB} = 5$ rad/s

$\alpha_{AB} = 12$ rad/s^2

2 ft

$\omega_{CD} = ?$

$\alpha_{CD} = ?$

IV. A small box of mass m is given a speed of
(20%) $V = \sqrt{\frac{1}{2}gr}$ at the top of the smooth half cylinder.
Determine the angle θ at which the box leaves the cylinder.

Prob. IV

※ 考生請注意：本試題不可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

V. (20%) Determine the position r_P of the center of percussion P of the 10 lb slender bar. What is the horizontal component of force that the pin at A exerts on the bar when it is struck at P with a force of $F=20\,lb$.