國立成功大學75學年度工程科學研究所考試(工程力學 試題) 共 1 頁 第 1 頁

1. Consider a homogeneous disk of R (radius) and mass m standing on a horizontal plane. At t=0 the center of mass of the disk is given an initial velocity v_o in the x direction and at the same time the disk is given an initial angular velocity ω_o about the axis of rotation. Determine the motion of the disk for t>0. (24%) Fig.1

2. The uniform bar ABC has a mass m and starts from rest with $\theta=180^\circ$ where A, B, C, and O are collinear. If the applied force P is constant in magnitude, determine the angular velocity ω of the bar as B reaches O with $\theta=0$. The mass of the roller at B and the mass of the strut OC are negligible. (20%) Fig.2

3. A marble of weight W, attached to an inextensible cord of negligible weight, is revolving on a smooth horizontal table. The cord passes through a hole in the table and is being pulled down by a force P. At the time under consideration the hole is at a distance r_o from the ball, and the cord is moving down at a constant velocity v_o. Find the tension T in the cord. (20%) Fig.3

4. Each of the two uniform hinged bars has a mass m and a length l, and is supported and loaded as shown. For a given force P determine the angle θ for equilibrium. The spring of stiffness k is undeformed when $\theta=0$. (18%) Fig.4

5. A homogeneous cylinder weighing 600 lb is resting on the 300 lb block A. The coefficient of friction for the cylinder at each contact surface is 0.30, and between the block A and the horizontal plane the coefficient is 0.20. Determine the minimum moment M necessary to rotate the cylinder counterclockwise. (18%) Fig.5

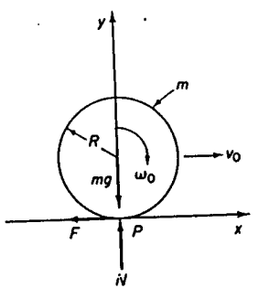

Fig.1

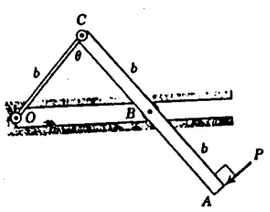

Fig.2

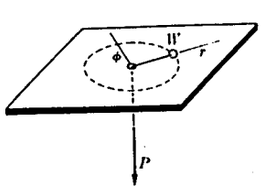

Fig.3

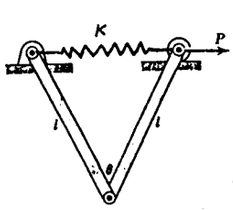

Fig.4

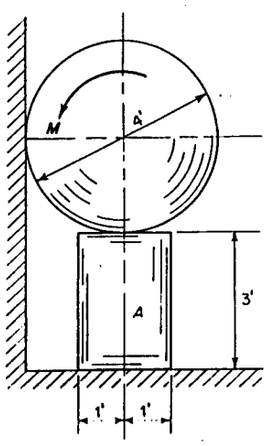

Fig.5