

國立臺北科技大學九十六學年度碩士班招生考試

系所組別：1511 自動化科技研究所甲組

第二節 工程力學 (選考) 試題

第一頁 共二頁

**注意事項：**

1. 本試題共四題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

1. The pipe shown in Figure 1 is gripped between two levels that are pinned together at  $C$ . The weight of the pipe is  $W$ . If the coefficient of static friction between the levels and the pipe is  $\mu$ , (a) please draw the free-body diagram of the system; and (b) determine the maximum angle  $\theta$  at which the pipe can be gripped without slipping. (Neglect the weight of the levels)

(25%)

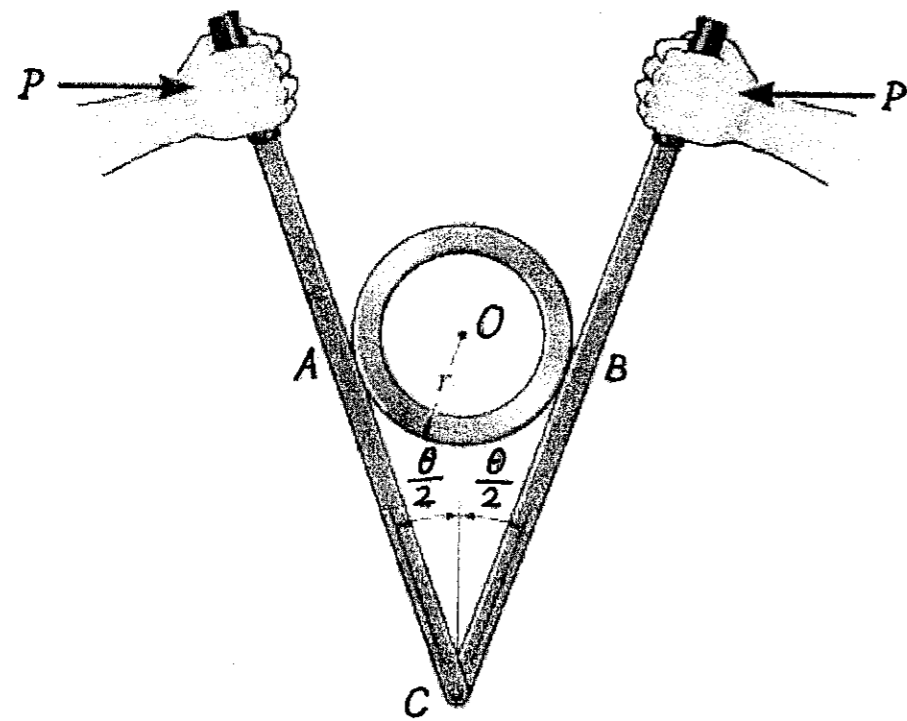


Figure 1

2. The homogeneous block having a mass  $m$  rests on the top surface of the cylinder, as shown in Figure 2. For equilibrium of such a system having a single degree of freedom, (a) please draw the free-body diagram of the system and determine its potential energy (or potential function); (b) what will be the relationship between  $h$  and  $R$  so that there is a condition of unstable equilibrium existing in the system?

(25%)

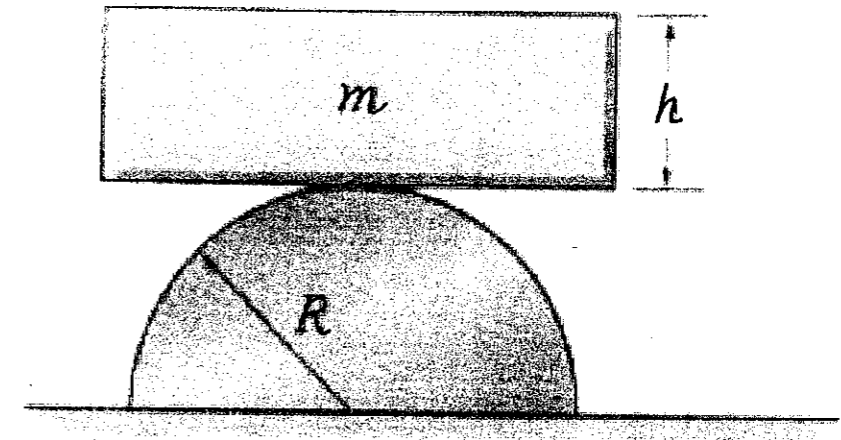


Figure 2

注意：背面尚有試題

at 3-3

3. The wheel of a radius  $R$  rolls without slipping, and its center  $O$  has an acceleration  $a_0$ , as shown in Figure 3. A point  $P$  on the wheel is a distance  $r$  from  $O$ . For given values of  $R$ ,  $a_0$ , and  $r$ , What will be the angle  $\theta$  and the velocity  $v_0$  of the wheel when  $P$  has no acceleration in this position?

(25%)

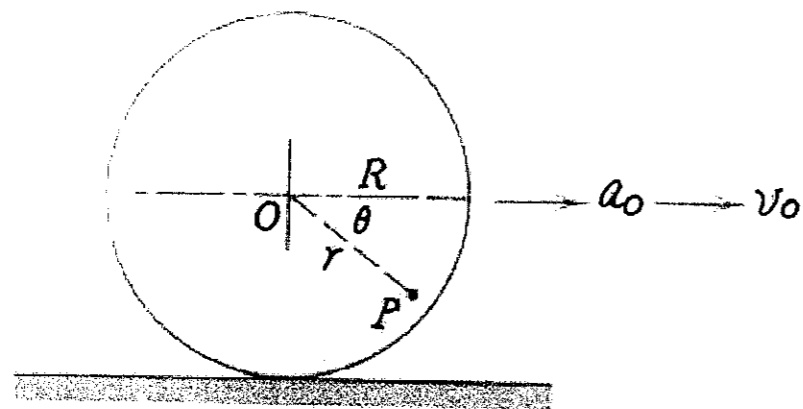


Figure 3

at 3-4

4. A homogenous thin triangular plate of mass  $m$  is welded to the horizontal shaft that rotates freely in the bearings at  $A$  and  $B$ , as shown in Figure 4. The width of the triangular plate is  $h$ . If the homogenous triangular plate is released from rest in the position shown, (a) please draw the free-body diagram of the system; (b) determine the magnitude of the bearing reaction at  $A$  after the plate has rotated  $90^\circ$ .

(25%)

(Given:  $I_{zz} = 1/6 mh^2$ )

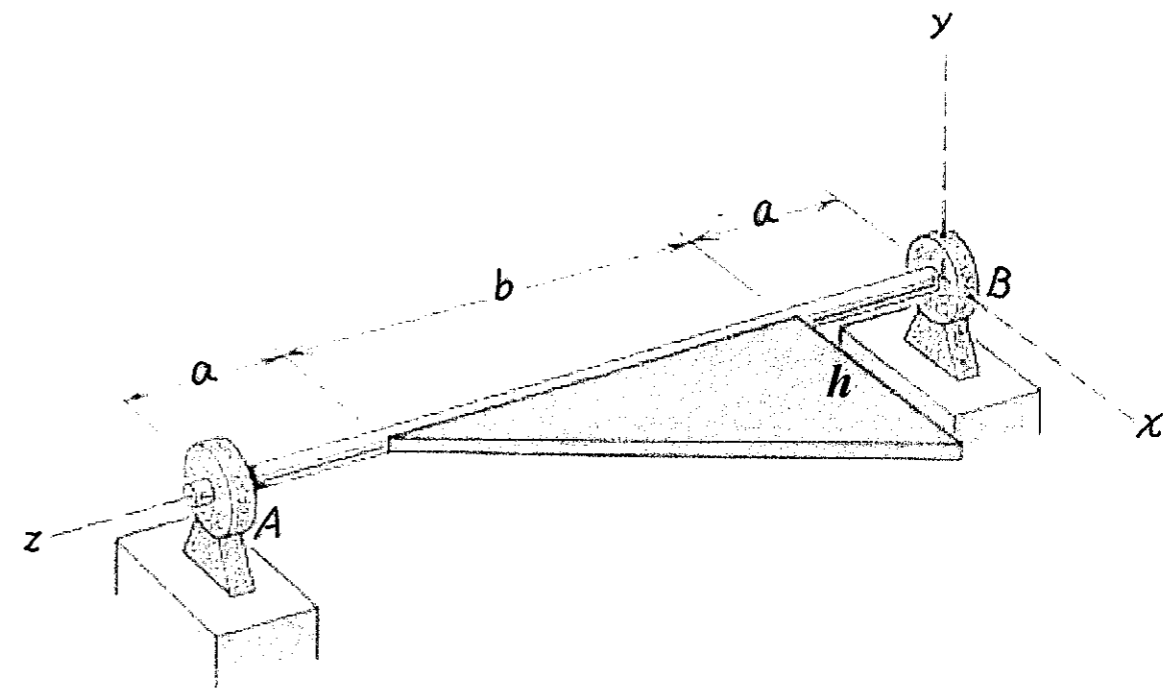


Figure 4