國立成功大學

112學年度碩士班招生考試試題

編　號：72

系　所：機械工程學系

科　目：動力學

日　期：0206

節　次：第 2 節

備　註：可使用計算機

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

1. (20%) The 0.8 kg block A is release from rest from the position shown in figure 1 and drops the distance $H = 0.6$ m before it collides with the 1.4-kg block B connected with the spring $k = 1000$ N/m. The coefficient of restitution is $e = 0.8$. Determine the maximum downward displacement block B. Neglect all friction. Please note that the position shown for the spring is compressed by the weight of block B.
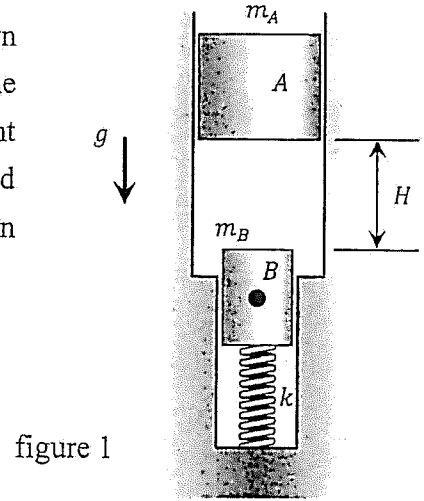
figure 1

2. (20%) The 0.3-kg uniform slender rod is pivoted at point O, as shown in figure 2. The spring $k = 0.28$ kN/m and the damper $c = 5$ N-s/m are connected with the rod at points A and B, respectively. Determine the natural frequency of the vibration system. Is the system underdamped, critically damped or over damped?
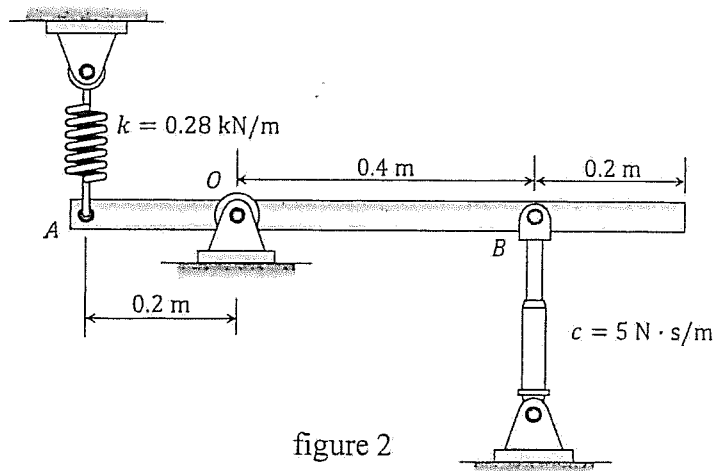
figure 2

3. (20%) The 2-kg wheel A is rolling without slipping on the ground, as shown in figure 3. Determine the minimum velocity of the wheel center V_O so that the wheel can just roll over the obstruction at B. The radius of gyration of the wheel about its center O is $k_O = 0.02$ m.
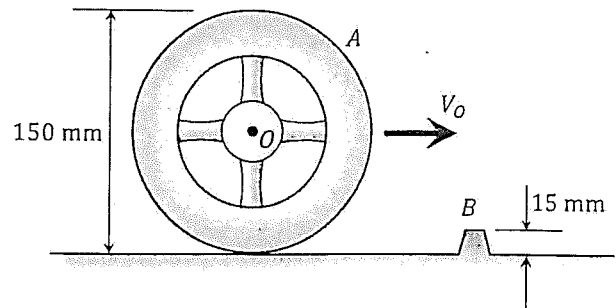
figure 3

4. (20%) Horizontal oscillation of the spring-loaded plunger E is controlled by varying the air pressure in the horizontal pneumatic cylinder F, as shown in Fig. 4. If the plunger has a velocity of 10 m/s to the right when $\theta = 30°$, determine the downward velocity v_D of roller D in the vertical guide and find the angular velocity ω of ABD for this position.
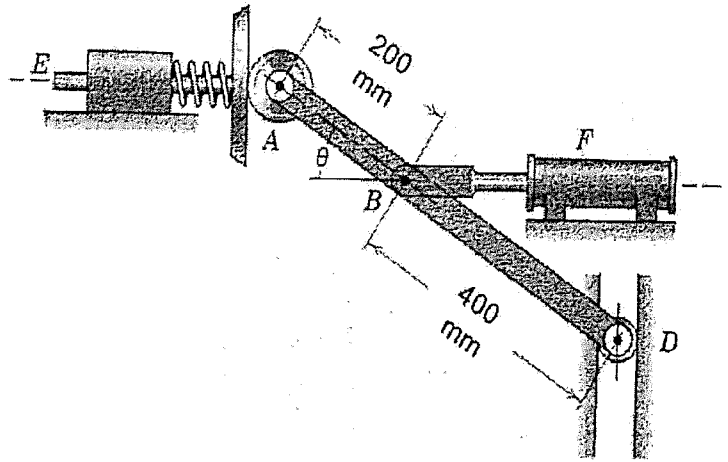

Fig. 4

5. (20%) The vertical rod has a downward velocity v = **10 m/s** when link *AB* is in the **30°** position shown in Fig. 5. Determine the corresponding angular velocity of *AB* and the speed of roller *B* if *R* = **1 m**.
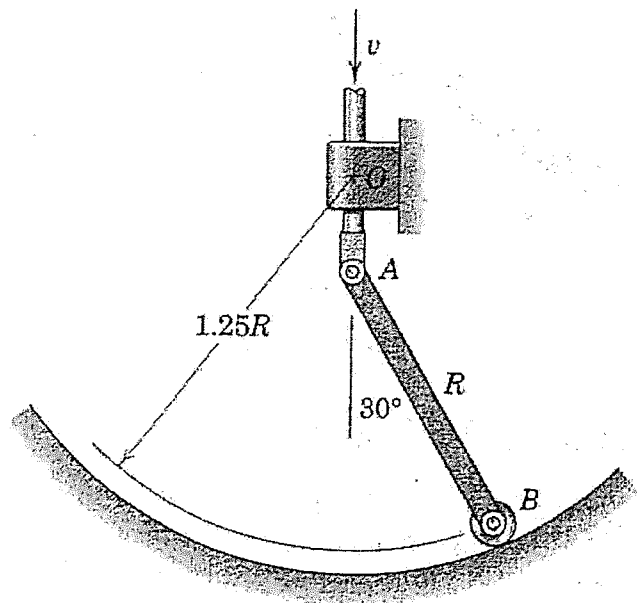

Fig. 5