淡江大學九十學年度碩士班招生考試試題

系別：機械工程學系　　科目：動　力　學

准帶項目請打「○」否則打「×」	
計算機	字典
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本試題共 壹 頁

1.

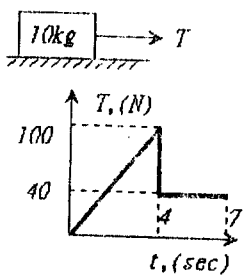

Figure 1

The *10-kg* block is resting on the horizontal surface when the force ***T*** is applied to it for *7 seconds*. The variation of ***T*** with time is shown in Figure 1.

Note: Gravity $g = 9.81 m/sec^2$, Static friction coefficient μ_s = Kinetic friction coefficient $\mu_k = 0.5097$)

(1)(05%) Determine the time that the block starts to move.

(2)(10%) Determine the maximum velocity reached by the block.

(3)(10%) Determine the total time during which the block is in motion.

2.

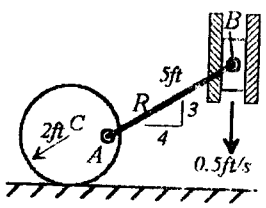

Figure 2

At the instant shown in Figure 2, point ***B*** of the block (to which rod ***R*** is pinned) has velocity $v_B = 0.5$ *ft/sec*.

(1)(25%) Find the angular velocity of the rolling cylinder.

3.

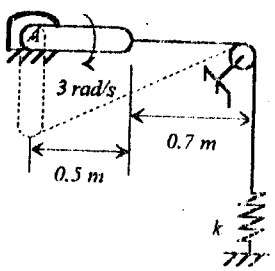

Figure 3

The *20-kg* bar in Figure 3 has an angular velocity of *3 rad/sec* clockwise. In that position the tensile force in the spring is *30 N*. After a 90^o clockwise rotation the angular velocity has increased to *4 rad/sec.*

(1)(05%) Determine the moment of inertia of the bar about point ***A***.

(2)(20%) Determine the spring modulus ***k***.

4.

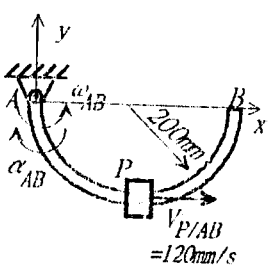

Figure 4

As shown in Figure 4, a particle ***P*** slides from ***A*** toward ***B*** along a semicircular rod ***AB*** of radius *200 mm*. The rod rotates about the pin ***A***, and the speed of ***P*** relative to the rod is constant at *120 mm/sec*. When the system is in the position shown, the angular velocity and angular acceleration of the rod are $\omega_{AB} = 0.8$ *rad/sec* counterclockwise and $\alpha_{AB} = 0.5$ *rad/sec*^{2} clockwise.

(1)(25%) For this position, determine the velocity and acceleration vector of ***P***.