

系所組別：機械工程學系丙組

考試科目：動力學及專業英文

考試日期：0219，節次：2

※ 考生請注意：本試題 可 不可 使用計算機

1. 專業英文：For each of the following terms, please write down its English name and describe its meaning in English. (25%)

- (1) 主慣性矩 (6%)
- (2) 保守力 (6%)
- (3) 角動量守恆 (6%)
- (4) 陀螺效應 (7%)

2. The wheel rolls without slipping over the ground as the collar slides at constant speed u over the curved guide bar. Determine the velocity and acceleration of the center of the wheel in terms of u when the linkage is in the position shown. (25%)

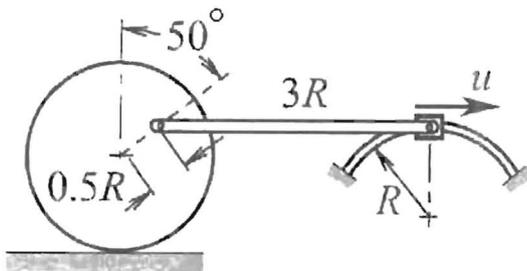


Figure of Problem 2

(背面仍有題目,請繼續作答)

※ 考生請注意：本試題 可 不可 使用計算機

3. The rigid 30-lb plank is struck by the 15-lb hammer head H . Just before the impact the hammer is gripped loosely and has a vertical velocity of 75 ft/s. If the coefficient of restitution between the hammer head and the plank is $e = 0.5$, determine the maximum height attained by the 60-lb block D . The block can slide freely along the two vertical guide rods. The plank is initially in a horizontal position. The gravitational constant $g_c = 32.2$ ft/sec². (25%)
4. For the mechanism shown, $BD = 0.254\text{m}$ and $BG_3 = 0.102\text{m}$, link 3 has a mass of 2 kg and polar mass moment of inertia of $0.01\text{kg}\cdot\text{m}^2$ about its mass center G_3 . Sliding block 2 has a constant velocity upward. For the given position, suppose we know the linear and angular accelerations of link 3 as follows:

$$\bar{a}_{G_3} = 60\text{m/sec}^2 \leftarrow (\text{to the left horizontally}); \quad \ddot{\theta}_3 = 392\text{rad/sec}^2 \text{ CW}$$

Determine the instantaneous force \bar{F} required to produce this motion, assuming that the slider blocks B and D are massless. Consider both the gravity load of link 3 (pointing downward) and its inertia force, neglecting friction in the kinematic pairs. The gravitational constant $g_c = 9.81\text{m/sec}^2$. (25%)

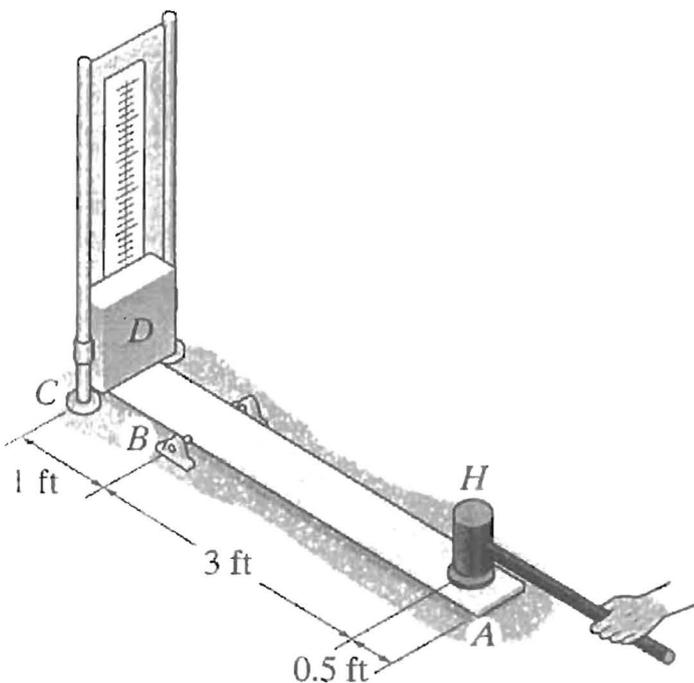


Figure of Problem 3

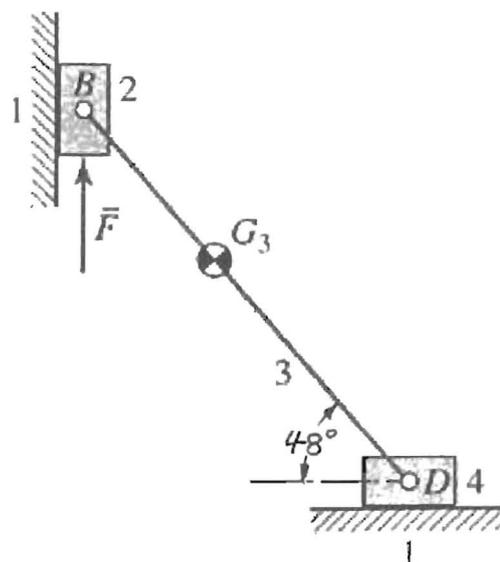


Figure of Problem 4