

## 國立臺北科技大學九十五學年度碩士班招生考試

系所組別：1120 機電整合研究所乙組

## 第二節 工程力學 試題

填准考證號碼

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第一頁 共一頁

**注意事項：**

1. 本試題共 4 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. In Figure 1, the hoisting gear  $A$  of pitch radius 100 mm drives the gear  $B$  of pitch radius 200 mm, where the block  $C$  is moved in a vertical direction via the rotation of the 50-mm-radius pulley rotated with the gear  $B$ . If the gear  $A$  has an initial angular velocity  $\omega_A = 8 \text{ rad/s}$  and a constant angular deceleration  $\alpha_A = -1.5 \text{ rad/s}^2$ , determine the velocity and acceleration of the block  $C$  when  $t = 2 \text{ s}$ . (25%)

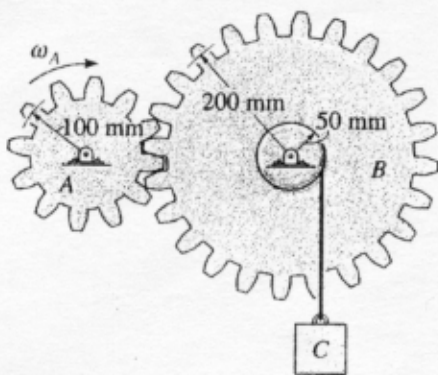


Figure 1

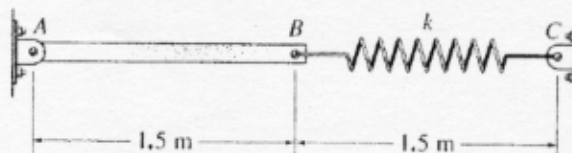


Figure 2

2. In Figure 2, the slender 10-kg bar  $AB$  is at rest and the spring is unstretched when the bar  $AB$  is horizontal. Neglect any frictional loss.
- (1). If the stiffness  $k$  of the spring is 5 N/m, determine the bar's angular velocity when it is released and has rotated downward  $90^\circ$ . (15%)
  - (2). Determine the stiffness  $k$  of the spring so that the motion of the bar is momentarily stopped when it is released and has rotated downward  $90^\circ$ . (10%)

3. Calculate the magnitude of the clockwise couple  $M$  required to turn the 50-kg cylinder in the supporting block shown in Figure 3. The coefficient of kinetic friction is 0.30. (25%)

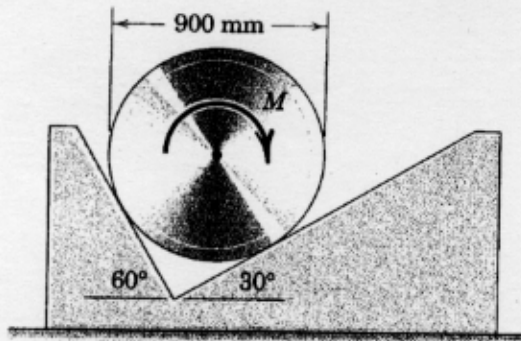


Figure 3

4. In Figure 4, the rigid rod  $AB$  of length  $2l$  is suspended from a fixed point  $O$  using two cords  $OA$  and  $OB$  each having a length  $1.5l$ . The mass of the rod and cords is negligible. If weights of  $3W$  and  $W$  are suspended from the ends  $A$  and  $B$ , respectively, determine the angle  $\theta$  of inclination when the system is in static equilibrium. (25%)

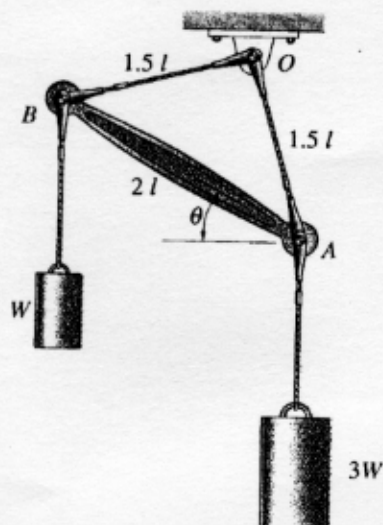


Figure 4