

1. 如圖(1)所示，一根 6 kg 木棍，原先靜止垂直懸吊著。若有一個 1kg 的球以 $v = 50\text{m/s}$ 撞到木棍上，且在撞擊過程中於 A 點沒有產生任何水平之衝力(impulse)。

(一) 請計算 d 之大小。 10%

(二) 若恢復係數 $e=0.6$ ，請計算木棍在碰撞過後之角速度。 10%

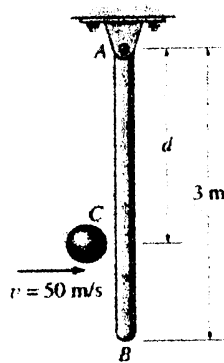


Fig.(1)

2. Using a forked rod, a smooth cylinder C having a mass of 0.5kg is forced to move along the vertical slotted path $r = 0.5\theta$ m Where θ is in radians. If the angular position of the arm is $\theta = 0.5t^2$ rad, where t is in seconds, determine the force of the rod on the cylinder and the normal force of the slot on the cylinder at the instant $t=2$ sec. The cylinder is in contact with only one edge of the rod and slot at any instant. 20%

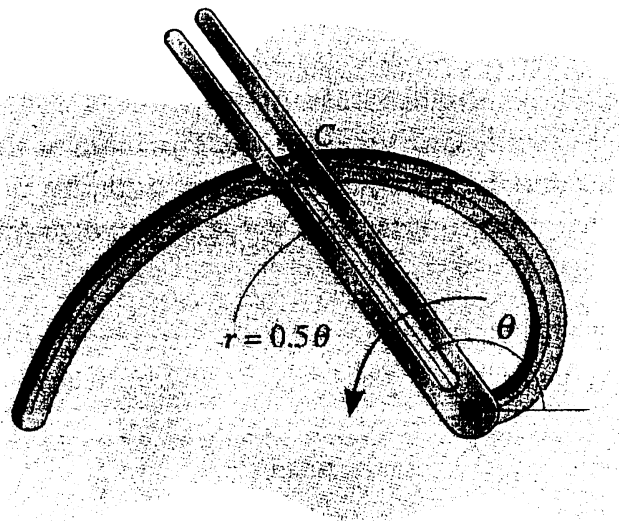


Fig. 2

(背面仍有題目,請繼續作答)

本試題是否可以使用計算機： 可使用， 不可使用（請命題老師勾選）

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3. The uniform slender pole shown in Fig. 3 has a mass of 100kg and a moment of inertia $I_G = 75 \text{ kg}\cdot\text{m}^2$. If the coefficients of static and kinetic friction between the end of the pole and the surface are $\mu_s = 0.3$ and $\mu_k = 0.25$ respectively. Determine the pole's angular acceleration at the instant the 400-N horizontal force is applied. The pole is originally at rest. 20%

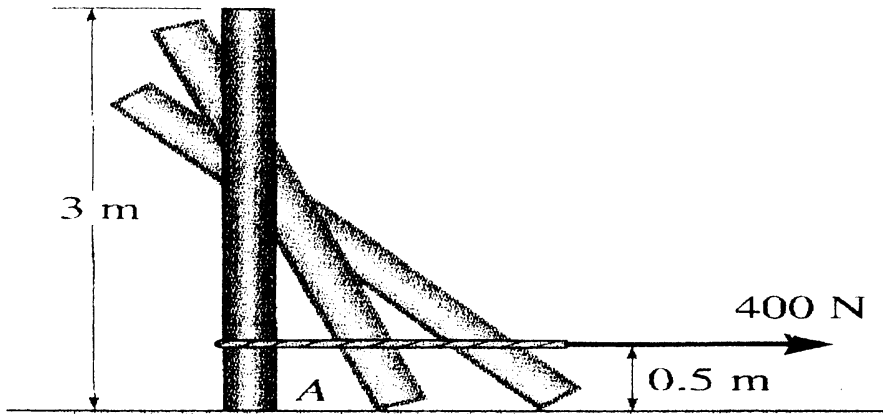


Fig.3

4. The 150 N (~15 kg) flywheel A has a radius of gyration of 100 mm. Disk B weighs 250 N (~25 kg) and is coupled to the flywheel by means of a belt which does not slip at its contacting surfaces. If a motor supplies a counterclockwise torque to the flywheel of $M = 50t \text{ N}\cdot\text{m}$, where t is in seconds, determine the time required for the disk to attain an angular velocity of 60 rad/s starting from rest. 20%

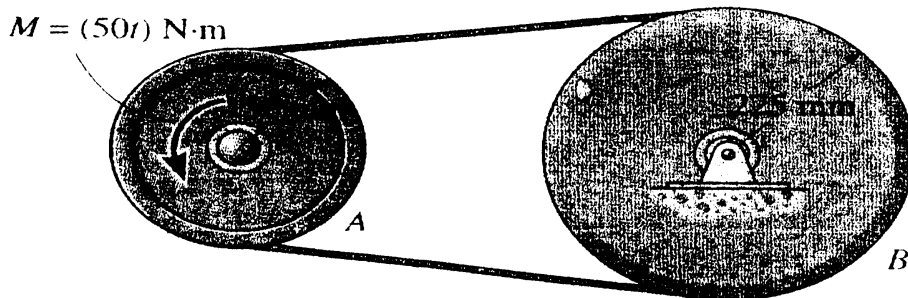


Fig.4

5. A circular disk rolls without slipping as shown in Fig. 5. At the instant, the angular velocity is ω and angular acceleration is α . Please answer the questions below

- A. Where is the Instantaneous zero velocity center? 4%
- B. Draw a picture to show the directions of the velocity of A, B and G. 8%
- C. Draw a picture to show the directions of acceleration of A, B and G. 8%

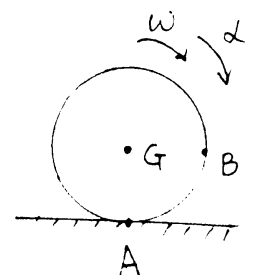


Fig. 5