

淡江大學九十一年度碩士班招生考試試題

66-1

系別：機械與機電工程學系

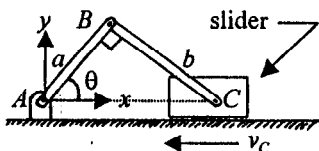
科目：動力學

准帶項目請打「○」否則打「×」	
計算機	字典
○	○

本試題共 2 頁

注意事項：這份試卷一共有四題，每題都必須回答。

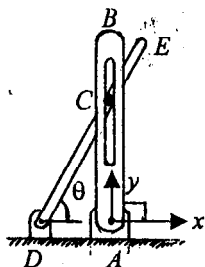
一、(25%)



A slider crank mechanism is shown in the figure. Links AB and BC have lengths $a = 200\text{mm}$ and $b = 200\sqrt{3} = 346\text{mm}$ respectively. The slider is confined to move on the ground. At the instant shown in the figure, $\theta = 60^\circ$, links AB and BC are at right angles, and slider C moves with a velocity $v_c = 80\sqrt{3} = 138.6\text{mm/sec}$.

- 1) Locate instantaneous centers of zero velocity of link AB and link BC .
- 2) Determine velocity of the pin B and angular velocities of links AB and BC by using the instantaneous center of zero velocity.

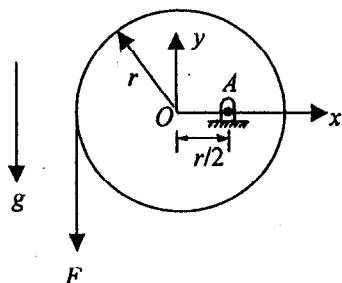
二、(25%)



Link DE has a pin at C , which is confined to move in the slot of link AB . The distance CD is 500mm . At the instant shown in the figure, link AB is perpendicular to the ground, link DE is at an angle $\theta = 60^\circ$, and link DE rotates with the speed $\dot{\theta} = 2\text{ rad/sec}$ (counterclockwise). Determine

- 1) Velocity of joint C .
- 2) Angular velocity ω of link AB .
- 3) The velocity of pin C relative to link AB .

三、(25%)



A uniform circular cylinder of a radius $r = 1000\text{mm}$ and a mass $m = 0.5\text{kg}$ is supported at point A , which has a distance $r/2$ from the center of mass O . A tangential force $F = 10\text{N}$ is applied to the cylinder as the cylinder rotates with a counterclockwise speed $\omega = 2\text{ rad/sec}$. Acceleration of gravity $g = 9.81\text{m/sec}^2$.

- 1) Draw free body diagram of this cylinder.
- 2) By solving equations of motion, obtain:
 - a) Reaction forces R_x and R_y at support A .
 - b) Angular acceleration $\ddot{\alpha}$ of this cylinder.

◀ 注意背面尚有試題 ▶

淡江大學九十一學年度碩士班招生考試試題

66-2

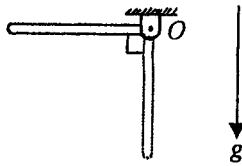
系別：機械與機電工程學系

科目：動力學

准帶項目請打「○」否則打「×」	
計算機	字典
○	○

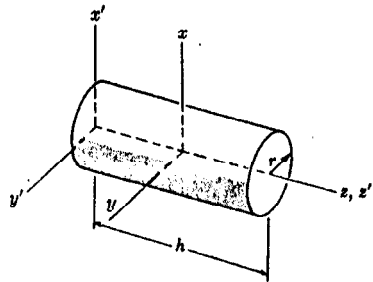
本試題共 2 頁

四、(25%)



A uniform slender rod of a length $l=1500\text{mm}$ is initially in the horizontal position, as indicated by the solid lines in the figure. This rod is then released from rest at this position. Determine angular velocity of this rod as it passes through the vertical position, indicated by dotted lines in the figure. The acceleration due to gravity $g=9.81\text{m/sec}^2$. Neglect friction in the pin joint.

Solid circular cylinder

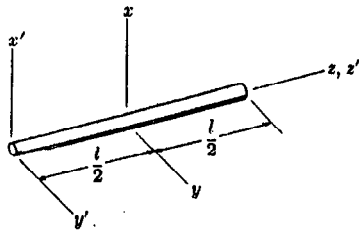


$$I_{xx} = I_{yy} = \frac{1}{2}m(3r^2 + h^2)$$

$$I_{zz} = I_{z'z'} = \frac{1}{2}mr^2$$

$$I_{x'z'} = I_{y'y'} = \frac{1}{2}m(3r^2 + 4h^2)$$

Slender rod



$$I_{zz} = I_{yy} = \frac{1}{12}ml^2$$

$$I_{x'z'} = I_{y'y'} = \frac{1}{12}ml^2$$