

淡江大學八十九學年度碩士班招生考試試題

系別：機械工程學系

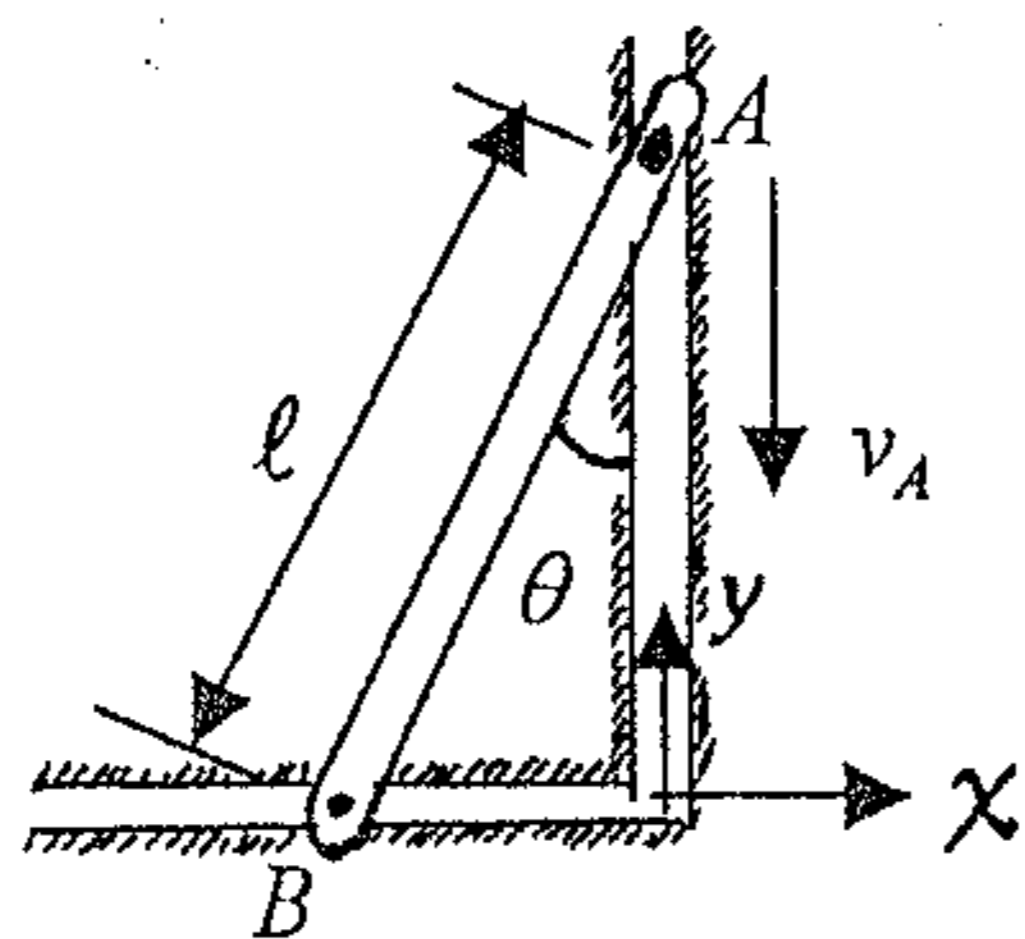
科目：動力學

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注意事項：這份試卷一共有四題，每題都必須回答。

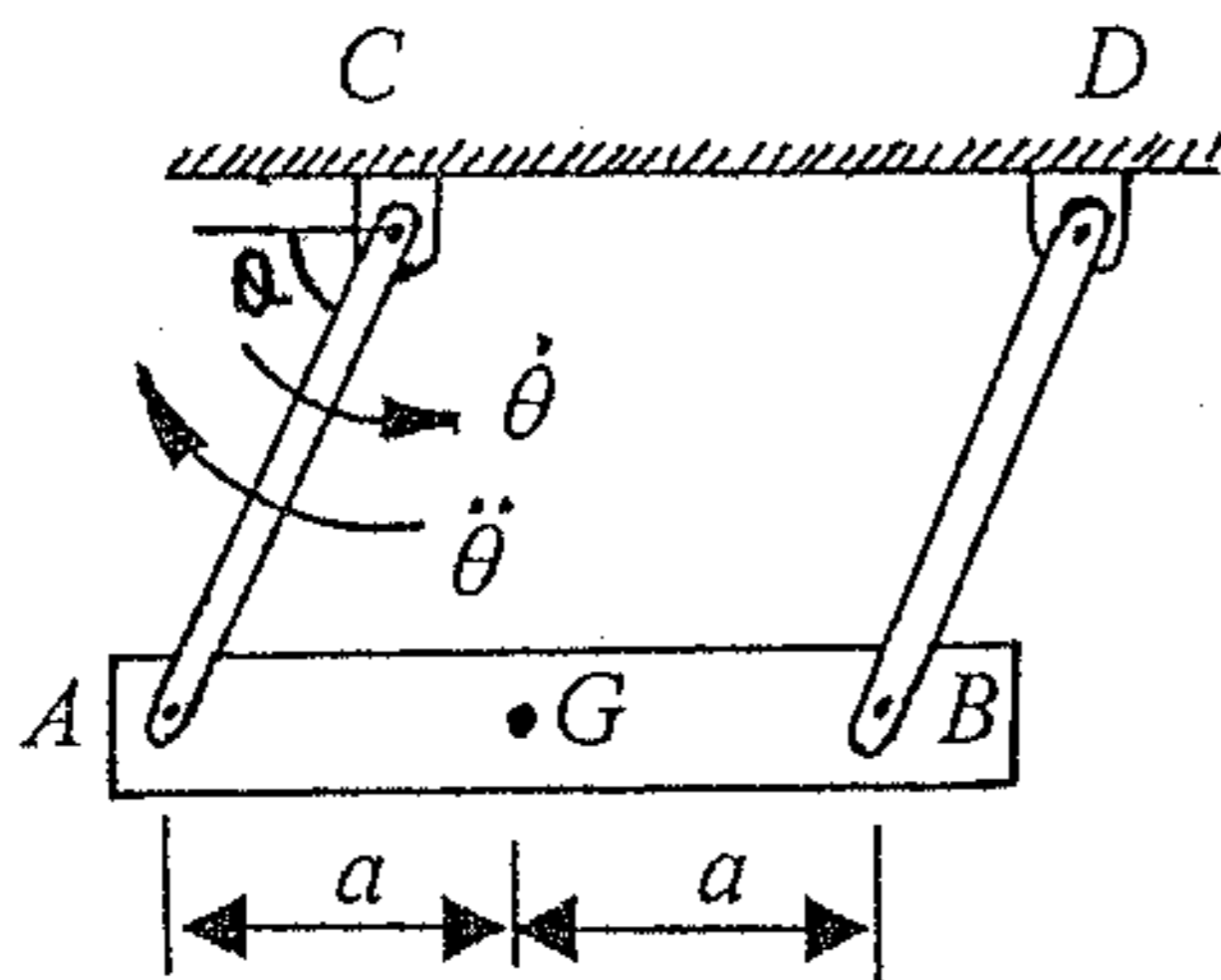
一、(25%)



Link AB has the length $\ell=240\text{mm}$. Pins A and B are confined to move in the slots. At the instant shown in the figure $\theta=30^\circ$ and pin A moves with a constant velocity $v_A=180\text{mm/sec}$.

- 1). Locate the instantaneous center of zero velocity of link AB .
- 2). Determine velocity of the pin B and angular velocity of this link by using the instantaneous center of zero velocity.
- 3). Determine angular acceleration of this link.

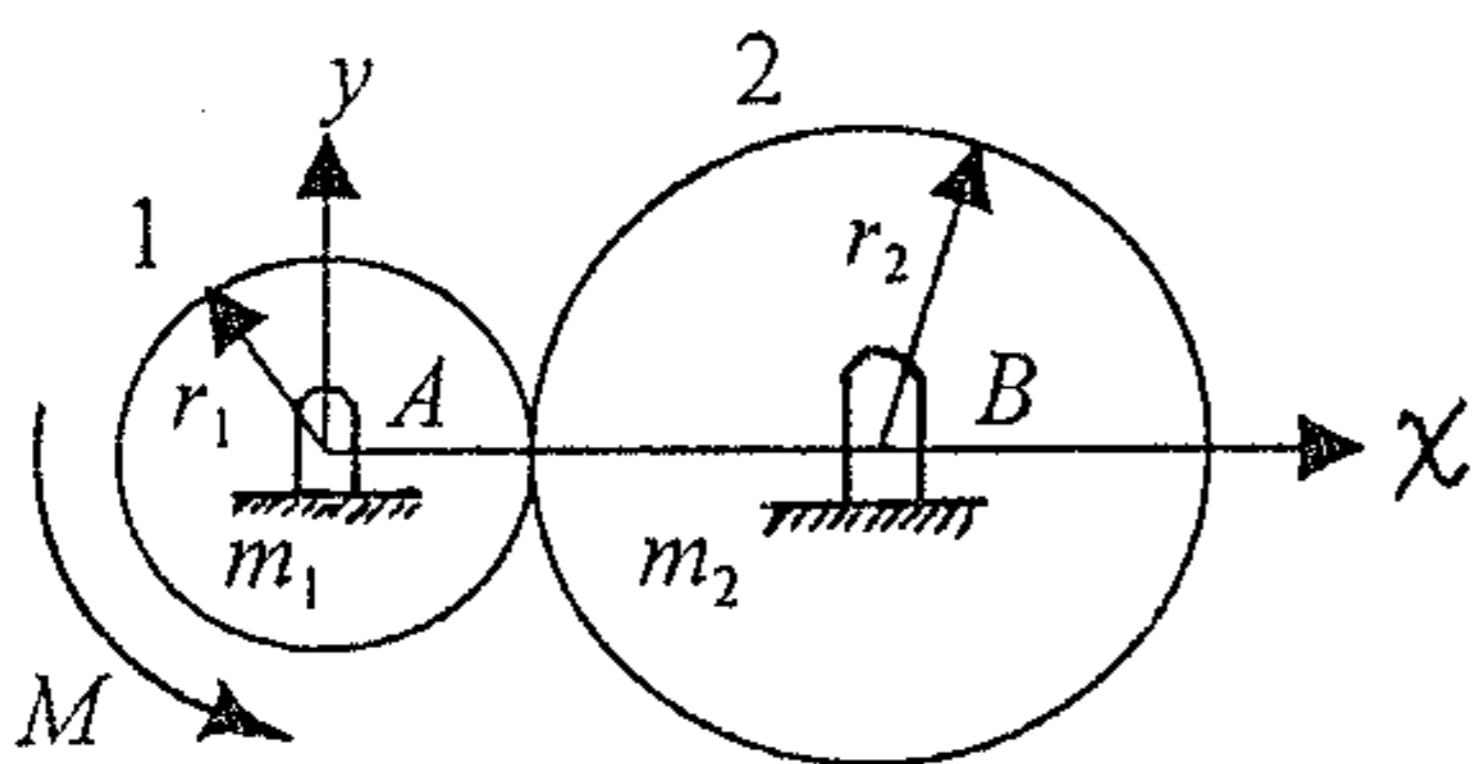
二、(25%)



Link AB is parallel to link CD and link AC is parallel to BD . At this instant $\theta=60^\circ$, $\dot{\theta}=2\text{ rad/sec}$, and $\ddot{\theta}=4\text{ rad/sec}^2$. Link AC has a length of 200mm and link AB has the half-length $a=120\text{mm}$. Determine:

- 1). Velocity and acceleration of joint A .
- 2). Velocity and acceleration of center of mass G of link AB .

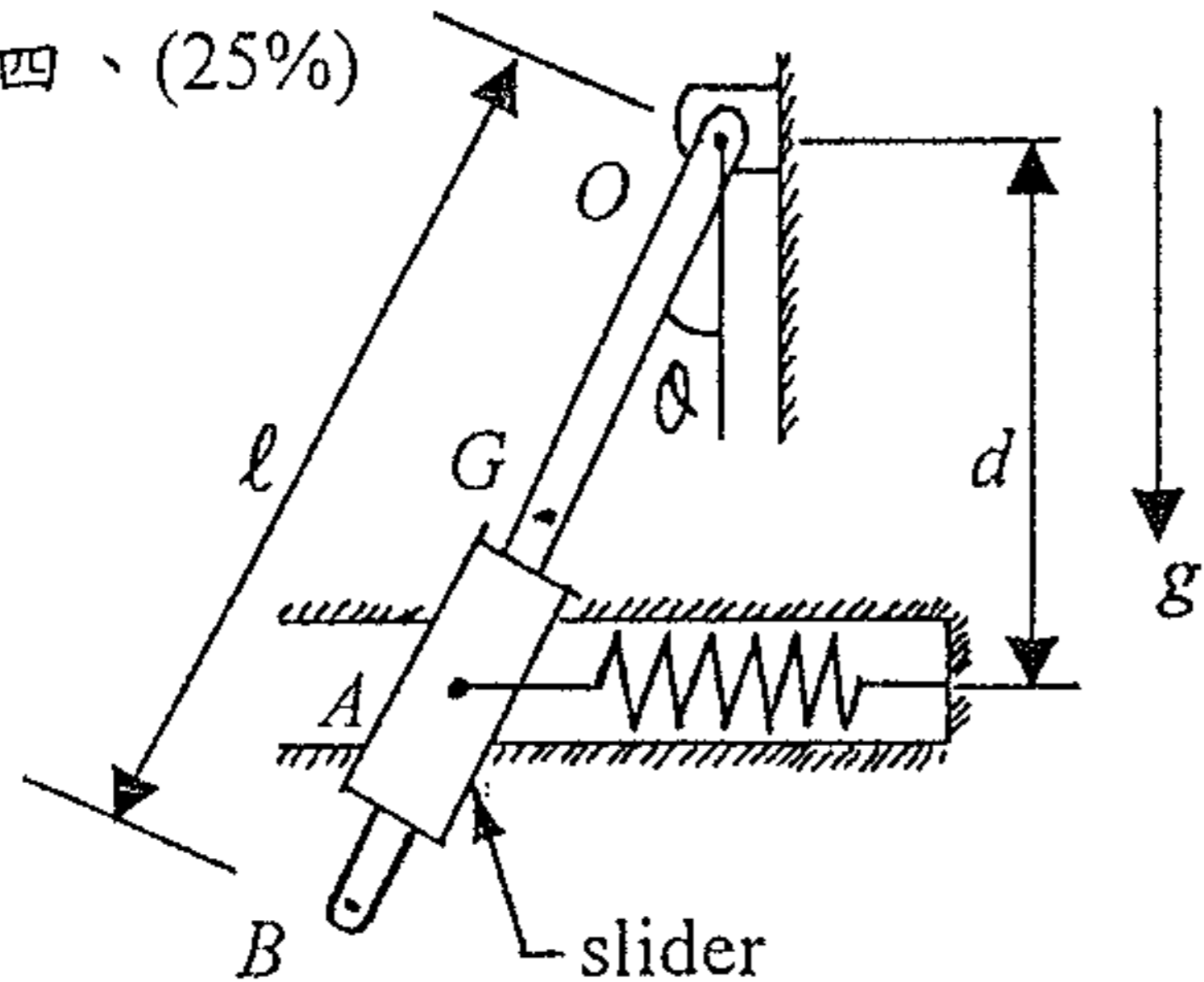
三、(25%)



Two circular bodies shown in the figure roll over each other without slipping. Points A and B are centers of these circles and also mass centers. The radii of the two bodies are $r_1=200\text{mm}$, $r_2=400\text{mm}$, and the masses are $m_1=0.2\text{ kg}$ and $m_2=0.8\text{ kg}$. The distance $AB=r_1+r_2$, so that there is no normal force at the contact point. At this instant a moment $M=0.6\text{ N}\cdot\text{m}$ is applied to body 1. Neglect gravity force in this problem.

- 1). Draw free body diagrams of these two bodies.
- 2). By solving equations of motion, obtain:
 - a). Reaction forces at A and B : $A_x, A_y, B_x,$ and B_y .
 - b). Angular accelerations of these two bodies : $\ddot{\alpha}_1$ and $\ddot{\alpha}_2$
 - c). Tangential contact force F at the contact point.

四、(25%)



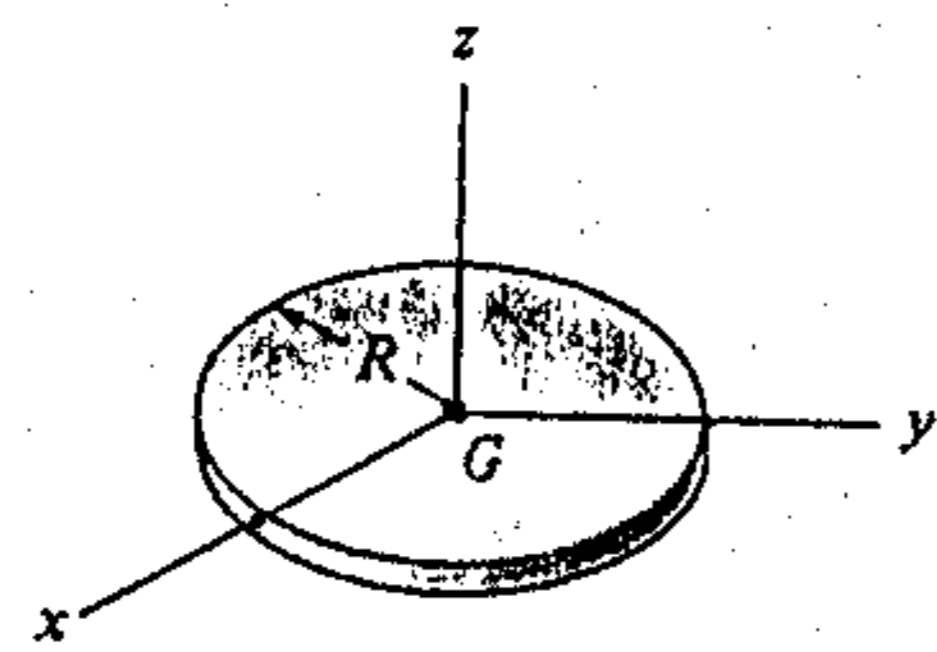
Link OB has a length $\ell=500\text{mm}$, and a mass $m=2\text{ kg}$. A spring is attached to a slider that moves along link OB . Spring constant $k=200\text{N/m}$, and the spring is unstretched when $\theta=0$. The distance $d=300\text{mm}$ and acceleration due to gravity $g=9.81\text{m/sec}^2$. Link OB is pulled to the position $\theta=30^\circ$ and then released from rest. Determine angular velocity ω of link OB when it passes the position $\theta=0$. Neglect friction in this mechanism and also neglect mass of the slider.

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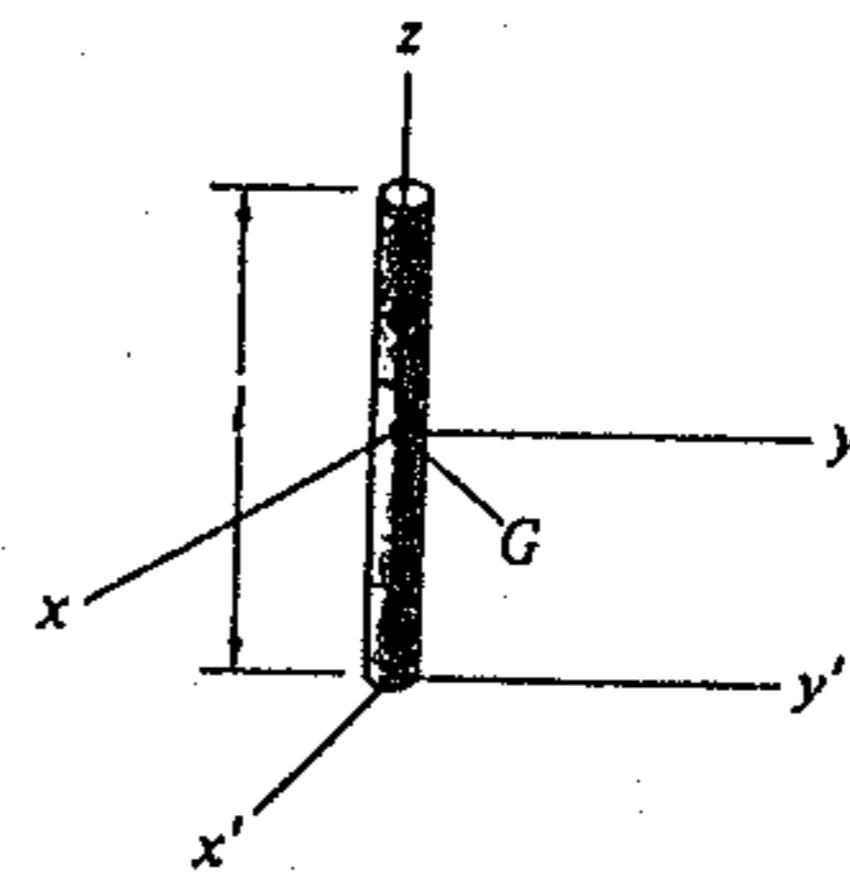
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Thin circular disk

$$I_{xx} = I_{yy} = \frac{1}{4}mR^2 \quad I_{zz} = \frac{1}{2}mR^2$$



Slender rod

$$I_{xx} = I_{yy} = \frac{1}{12}ml^2 \quad I_{x'x'} = I_{y'y'} = \frac{1}{3}ml^2 \quad I_{zz} = 0$$

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◀ 注意背面尚有試題 ▶