

國立臺北科技大學 106 學年度碩士班招生考試

系所組別：1120 機械工程系機電整合碩士班乙組

第二節 工程力學 試題

第一頁 共一頁

注意事項：

1. 本試題共四題，每題 25 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。

一、A given force P is applied on the handle of the toggle clamp shown in Fig. 1. Assume that the shaft slides freely in its guide.

- (1) For $P = 120 \text{ N}$ and $\theta = 15^\circ$, determine the clamping force C . (20 分)
- (2) Please comment on the magnitude of the clamping force C this toggle clamp can generate while the angle θ decreases. (5 分)

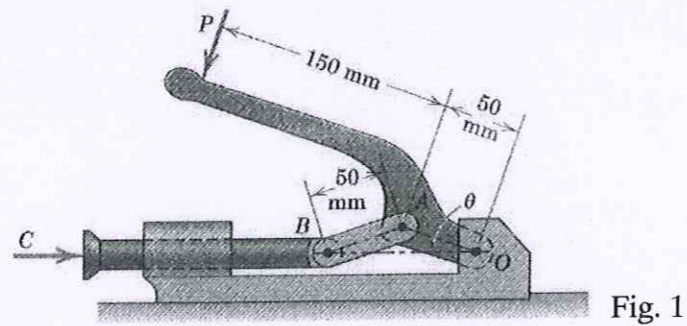


Fig. 1

二、The homogeneous semicylinder rests on a horizontal surface and is subjected to the force P applied to a cord firmly attached to its periphery, as shown in Fig. 2. The force P is slowly increased and kept normal to the flat surface of the semicylinder. If slipping is observed just as θ reaches 40° , determine the coefficient of static friction μ_s . (25 分)

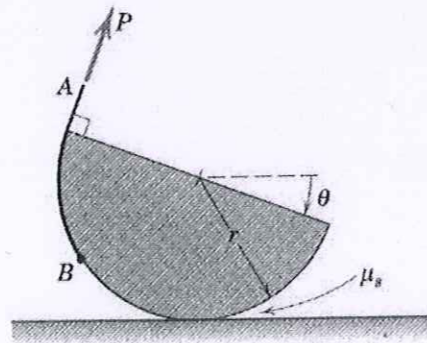


Fig. 2

三、The suspended mass m is stationary as shown in Fig. 3.

- (1) What are the tensions in the strings? (5 分)
- (2) If string A is cut, what is the tension in string B immediately afterward? (10 分)
- (3) After string is cut and the mass swings afterward, what would be the maximum tension in string B ? (10 分)

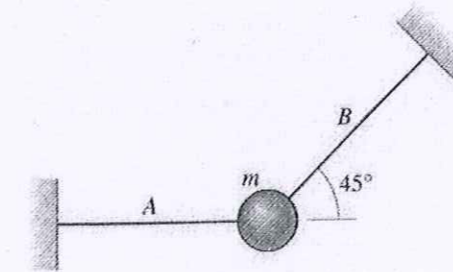


Fig. 3

四、The slender bars AB and BC in Fig. 4 have mass m and length L and the collar C has mass m_c . A torsional spring at A exerts a clockwise couple $k\theta$ on bar AB . The system is released from rest in the position $\theta = 0$ and allowed to fall. Neglecting friction, determine the angular velocity $\omega = d\theta/dt$ of bar AB as a function of θ . (25 分)

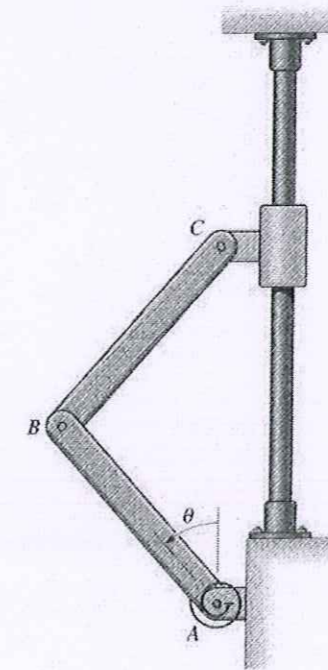


Fig. 4