

淡江大學八十九學年度日間部轉學生招生考試試題

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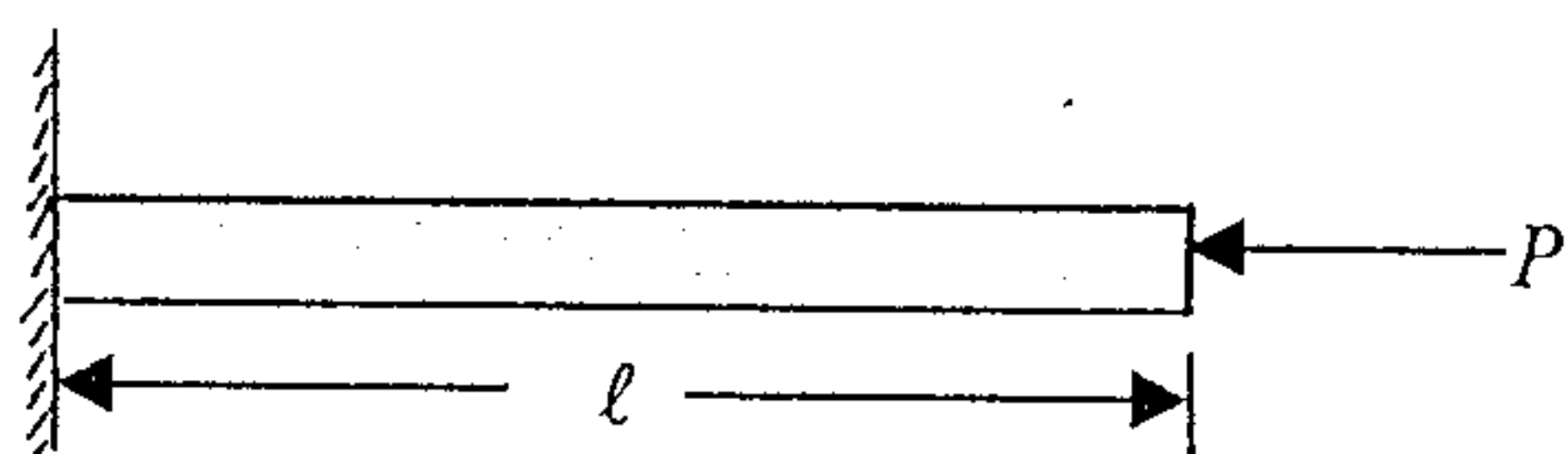
系別：機械工程學系三年級

科目：工程力學

(含靜力學、動力學、材料力學)

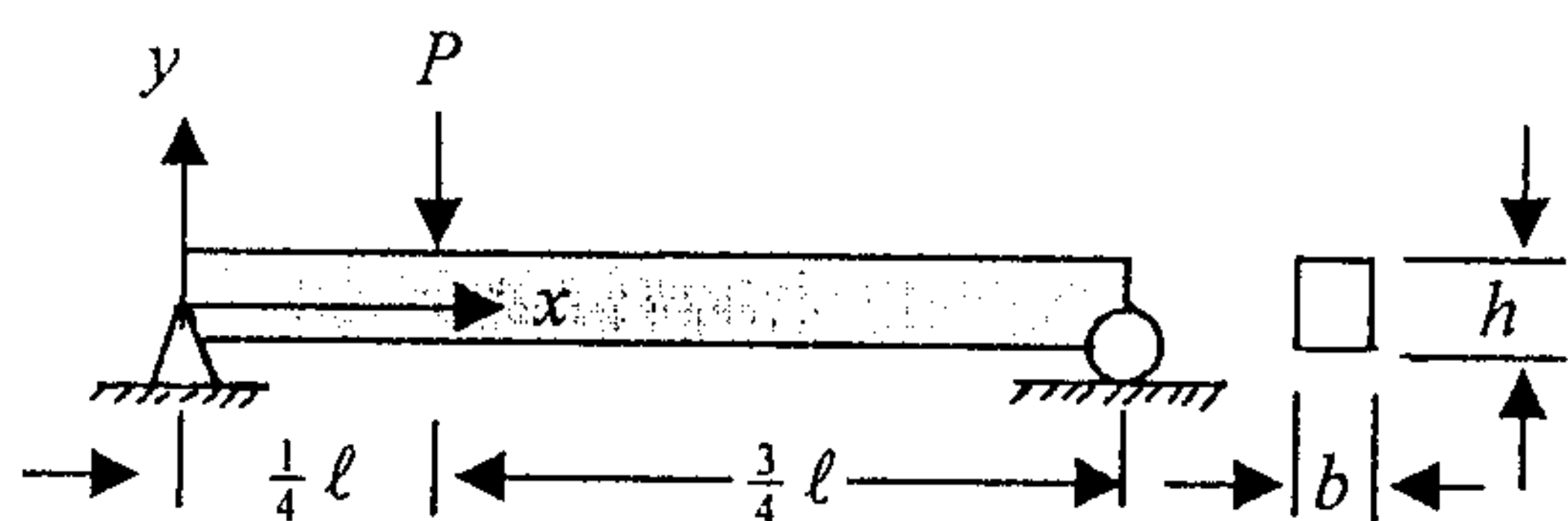
本試題共 / 頁

1.(25%)



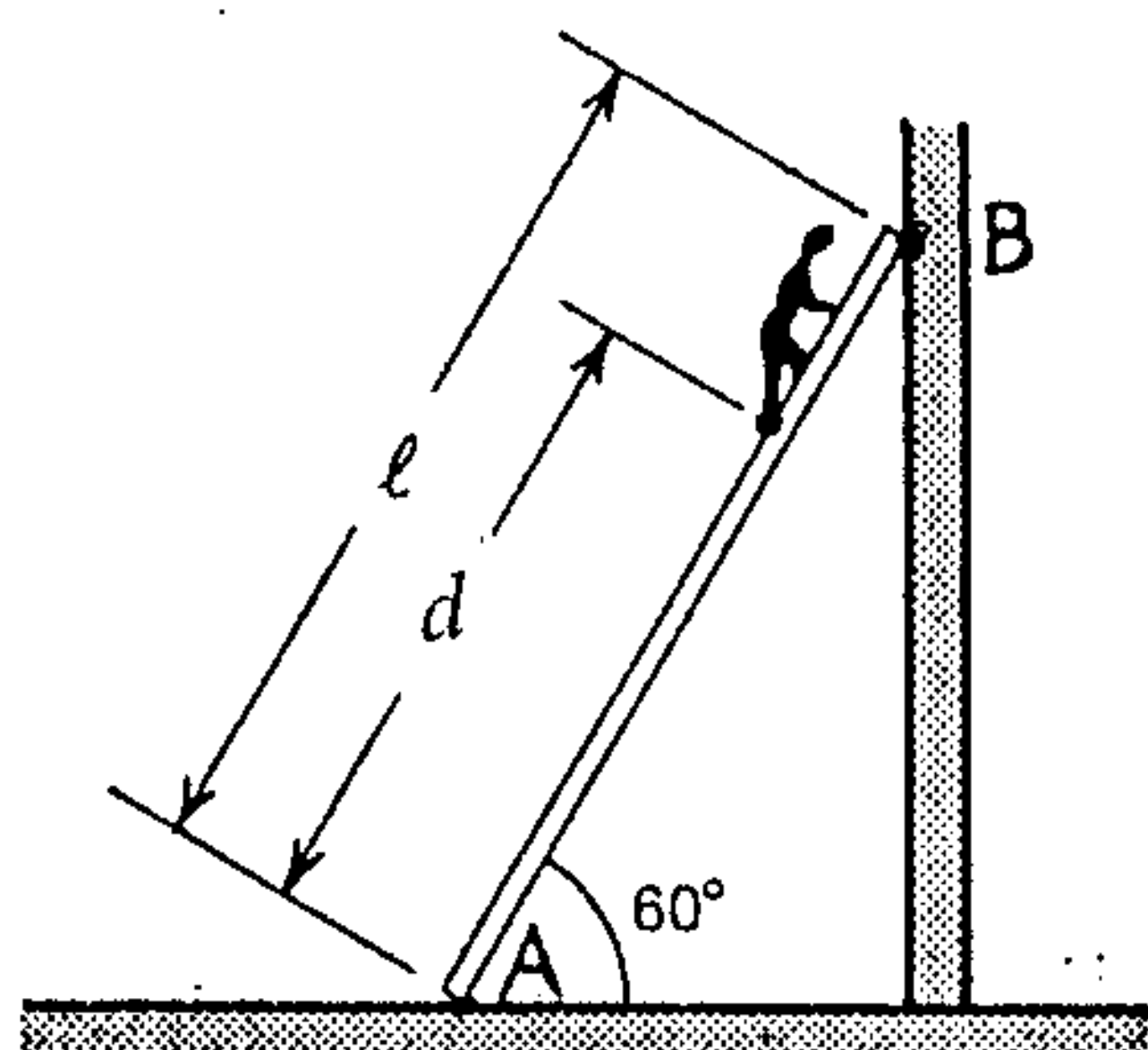
A uniform bar is subjected to a temperature increase $\Delta T=75^\circ\text{C}$ and a compressive force $P=9\text{kN}$. The bar has the original length $l=150\text{ mm}$, and the cross section area $A=36\text{mm}^2$. Modulus of elasticity $E=75\text{Gpa}$, and the coefficient of thermal expansion $\alpha=24\times 10^{-6}/^\circ\text{C}$. Determine axial displacement of the bar.

2.(25%)



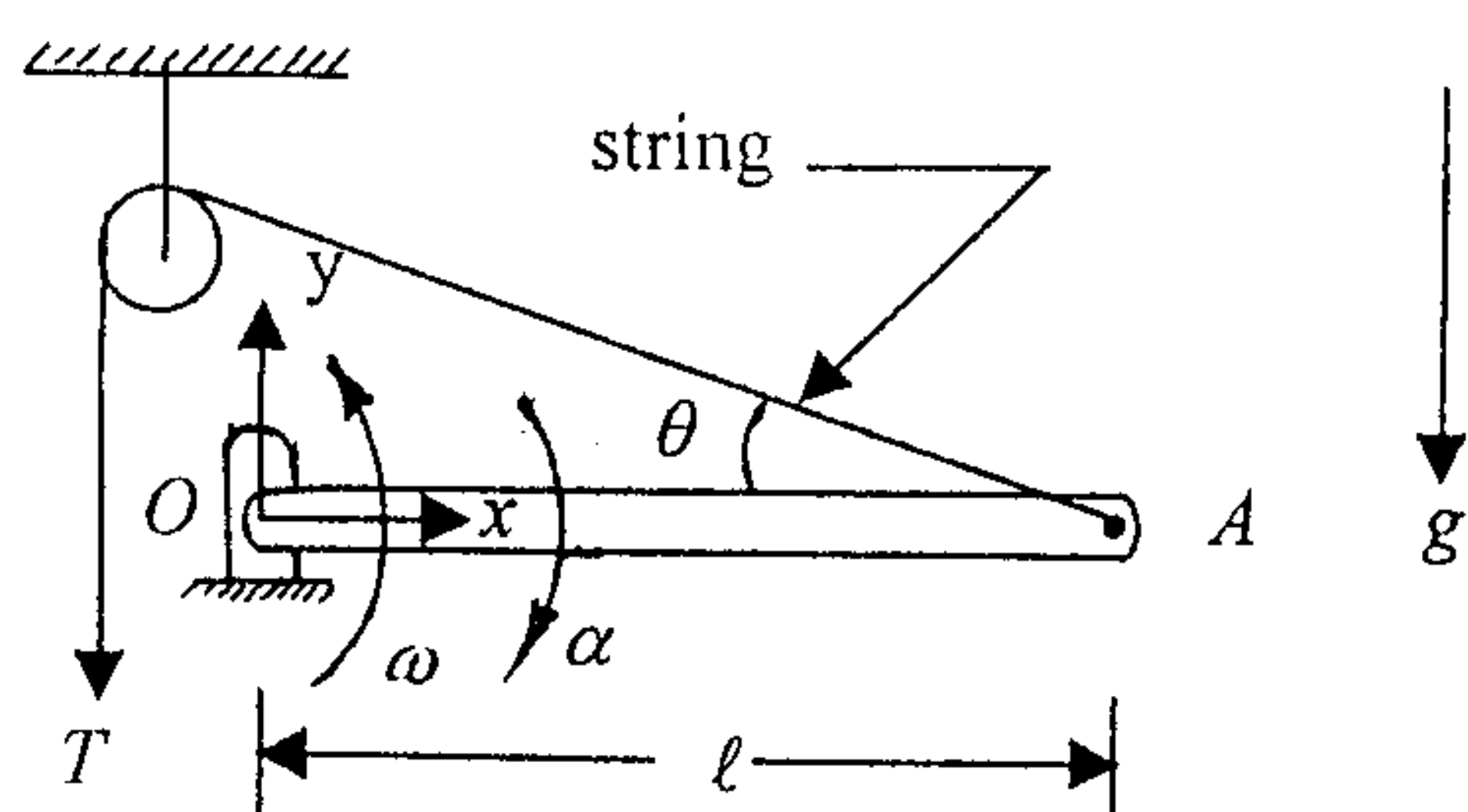
A simply supported beam of length l is subjected to a concentrate load P . The cross section of the beam is rectangular with the width b and the height h . Neglect the weight of the beam. Determine
(a) the maximum bending moment in this beam.
(b) the maximum normal stress $(\sigma_{xx})_{\text{max}}$ in this beam.

3.(25%)



A person climbs up a ladder of length l . Coefficients of static friction between the ladder and the floor (*i.e.* at the point A) and between the ladder and the wall (*i.e.* at the point B) are equal and are represented by μ . Assuming the weight of the person is W and the weight of the ladder may be neglected.
(a) Draw free body diagram of this ladder.
(b) Determine the distance d at which the ladder begins to slide.

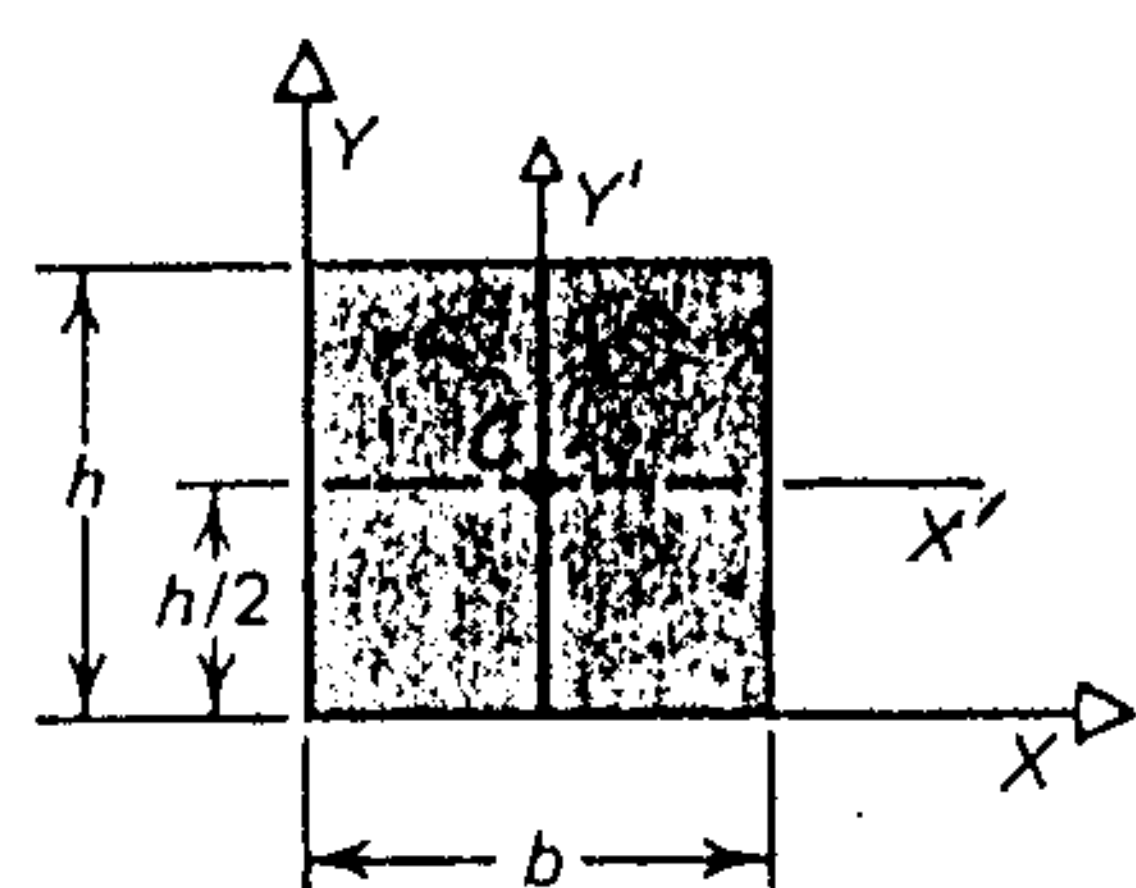
4.(25%)



Slender rod OA has the mass $m=0.6\text{kg}$ and a length $l=200\text{mm}$. This rod is pulled by a string at A . At the instant shown in the figure $\theta=30^\circ$, the angular velocity $\omega = 4\text{rad/sec}$, and angular acceleration $\alpha = 10\text{rad/sec}^2$.
(a) Draw free body diagram of this rod.
(b) Determine reaction forces at O and tension force T in the string ($g=9.8\text{m/sec}^2$).

Area Moments of Inertia

Rectangle

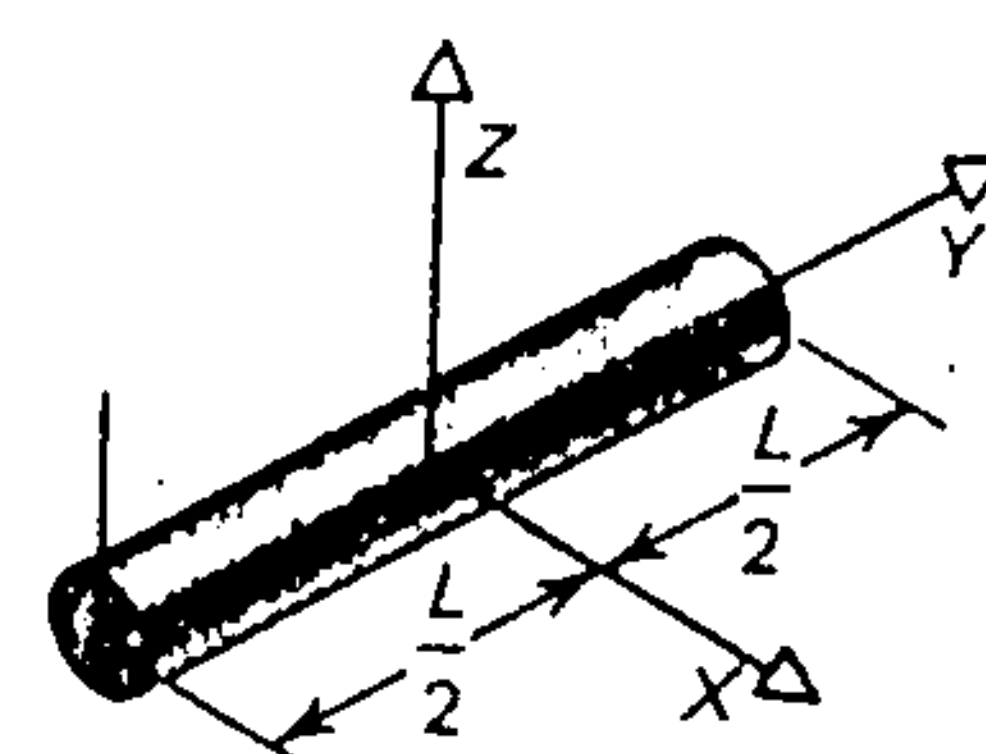


$$I_{y'} = \frac{1}{12}bh^3$$

$$I_x = \frac{1}{3}bh^3$$

Mass Moments of Inertia

Slender rod



$$I_x = I_z = \frac{1}{12}mL^2$$