

國立臺灣師範大學 103 學年度碩士班招生考試試題

科目：應用力學(含靜力學與動力學)

適用系所：機電工程學系

注意：1.本試題共 3 頁，請依序在答案卷上作答，並標明題號，不必抄題。2.答案必須寫在指定作答區內，否則不予計分。

1. Replace the force system acting on the post by a resultant force F_R and specify its magnitude, direction, and where its line of action intersects the post AB measured from point A. Given: $L = 1m, P = 100N$. (Fig.1) (12 分)
2. If the cable BC can be subjected to a maximum tension of T , determine the maximum force F which may be applied to the plate. Compute the x, y, z components of reaction at the hinge A for this loading. Given: $T = 1kN, L = 1m$. (Fig.2) (12 分)
3. Determine the force in members CD and GF of the truss and state (indicate tension or compression). Also indicate all zero-force members.
Given: $P = 1kN, L = 1m$. (Fig.3) (14 分)
4. The uniform thin pole has a weight of W and a length of L . If it is placed against the smooth wall and on the rough floor (static friction coefficient μ_s) in the position d , will it remain in this position when it is released?
Given: $W = 200N, L = 8m, d = 3m, \mu_s = 0.3$. (Fig.4) (12 分)
5. The block B, having a mass of m , is attached to the vertex A of the right circular cone using a light cord. If the block has a speed of v around the cone, determine the tension T in the cord and the reaction which the cone exerts on the block.
Neglect the size of block and the effect of friction.
Given: $m = 0.4kg, v = 1m/s, L = 0.4m, R = 0.6m, H = 0.8m$. (Fig.5) (12 分)
6. The cue ball A is given an initial velocity $(v_A)_1$. If it makes a direct collision with

國立臺灣師範大學 103 學年度碩士班招生考試試題

ball B (coefficient of restitution e), determine the velocity of B and the angle θ just after it rebounds from the cushion at C (coefficient of restitution e'). Each ball has a mass of m . Neglect the size of each ball.

Given: $(v_A)_1 = 4m/s, e = 0.8, e' = 0.6, m = 0.4kg$. (Fig.6) (12 分)

7. Determine the vertical and horizontal components of reaction at the pin support A and the angular acceleration of the rod with mass m at the instant shown, when the rod has an angular velocity ω . Given: $m = 10kg, L = 0.6m, \omega = 4rad/s$. (Fig.7) (12 分)

8. The slender rod has a mass m and is suspended at its end A by a cord. If the rod receives a horizontal blow giving it an impulse I at its bottom B, determine the location y of the point P about which the rod appears to rotate during the impact. (Fig.8) (14 分)

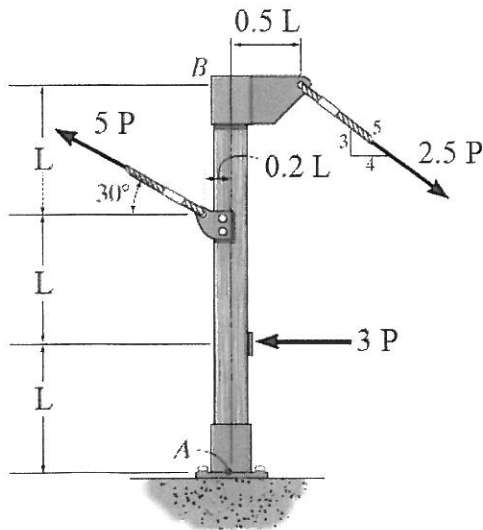


Fig. 1

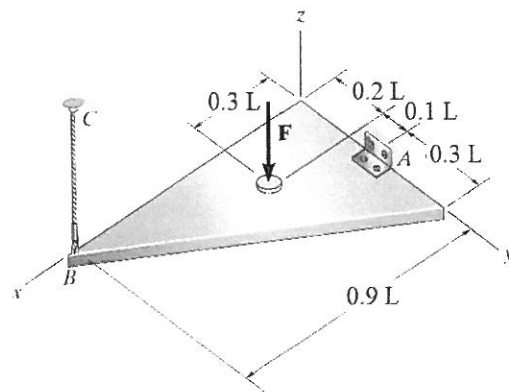


Fig. 2

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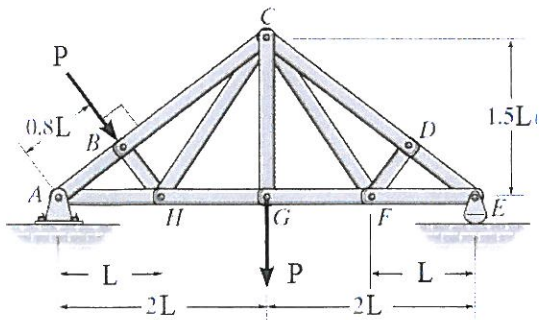


Fig. 3

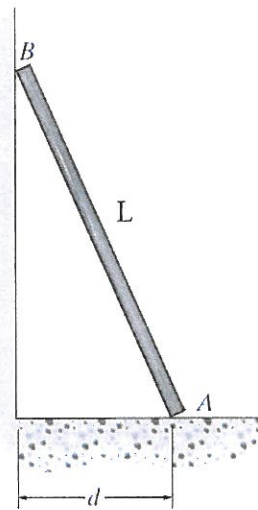


Fig. 4

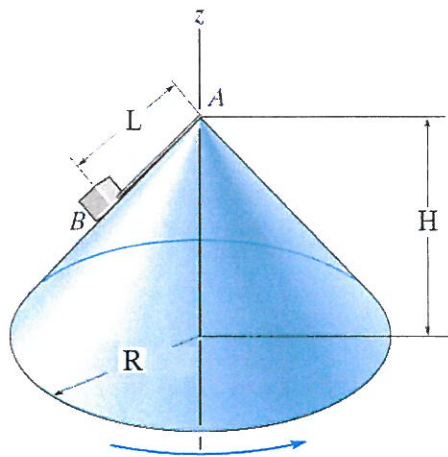


Fig. 5

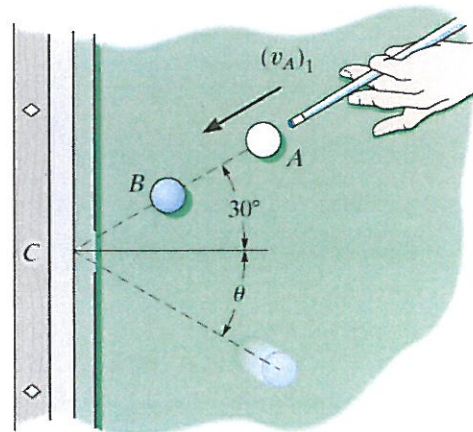


Fig. 6

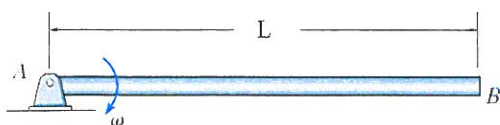


Fig. 7

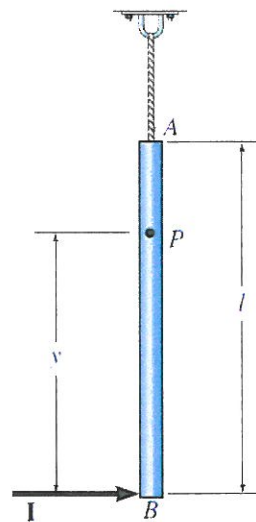


Fig. 8

