

編號：137

國立成功大學 109 學年度碩士班招生考試試題

系 所：航空太空工程學系

考試科目：動力學

考試日期：0210，節次：2

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※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. (25%) Determine the minimum initial velocity and the corresponding angle at which the ball must be kicked in order for it to just cross over the 3 meters high fence, which is 6 meters away from the ball.
2. (25%) A commercial four-engined jet aircraft is cruising at a constant speed of 800 km/h in level flight when all four engines are in operation. Each of the engines is capable of discharging combustion gases with a velocity of 775 m/s relative to the plane. If during a test two of the engines, one on each side of the plane, are shut off, determine the new cruising speed of the jet. Assume that air resistance (drag) is proportional to the square of the speed, that is, $F_D = cv^2$, where c is a constant to be determined. Neglect the loss of mass due to fuel consumption.

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3. The piston rod CA of the hydraulic cylinder has a constant upward velocity of 0.5 m/s. For the angle θ at 60° as shown in figure 3, determine:
- the angular velocity of the slender beam BD; (12%)
 - the acceleration of point D. (13%)

4. The 5-kg bar of length l is released from rest with its end rollers traveling in the vertical-plane slot shown in figure 4. Determine:
- the angular velocity of the beam AB when A passes C; (15%)
 - the angular acceleration of the beam AB when it is released initially. (10%)

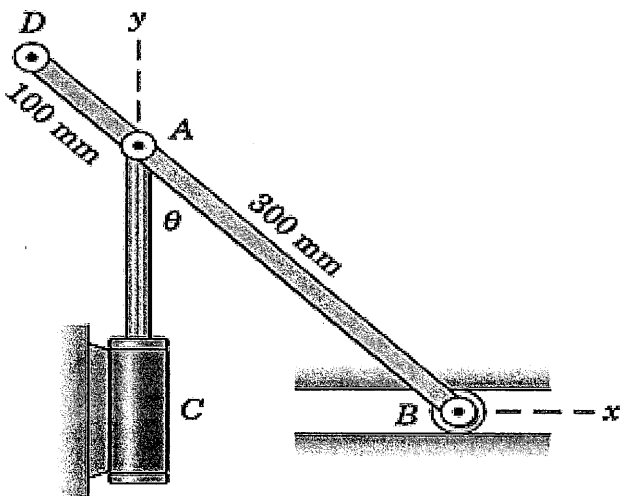


Figure 3

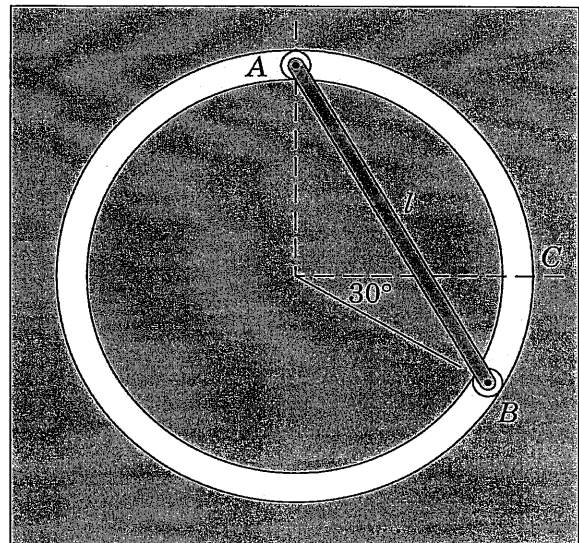


Figure 4

- Note: 1. The gravity points downward.
 2. If you cannot hand-computing the equations, use symbols and marks on the figure to help presenting your derivations. You need to draw figures in your answer sheet.