

國立成功大學  
110學年度碩士班招生考試試題

編 號：133

系 所：航空太空工程學系

科 目：動力學

日 期：0202

節 次：第 2 節

備 註：不可使用計算機

※ 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。

- A projectile is fired with a speed of  $v = 60 \text{ m/s}$  at an angle of  $60^\circ$ . A second projectile is then fired with the same speed  $0.5 \text{ s}$  later. Define the fired angle  $\theta$  of the second projectile so that the two projectiles collide. Use the collide time  $t_c$  after the first projectile is fired and  $\theta$  to answer the following questions. (30%)

  - At what position  $(x, y)$  will this happen?
  - Determine the collide time as a function of  $\theta$ .
- A rocket having a total mass of  $6 \text{ Mg}$  is fired vertically from rest. If the engines provide a constant thrust of  $T = 300 \text{ kN}$ . Neglect the effect of drag resistance and the loss of fuel mass and weight. (20%)

  - Determine the power output of the engines as a function of time.
  - When will this rocket reach the altitude of  $100 \text{ km}$ ?
- Given the constant angular velocity  $\omega_0$  and known  $r$  in figure 3, determine the angular velocity and the angular acceleration of link  $AB$  and the velocity and the acceleration of collar  $B$  for the position shown. (25%)
- For the pivoted slender rod of length  $l$ , determine the distance  $x$  for which the angular velocity will be a maximum as the bar passes the vertical position after being released in the horizontal position shown in figure 4. Also, calculate the corresponding angular velocity. (25%)

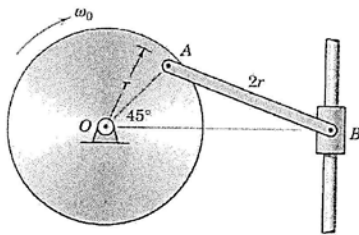


Figure 3

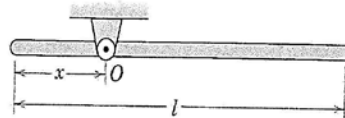


Figure 4