

國立成功大學

113學年度碩士班招生考試試題

編 號：162

系 所：太空系統工程研究所

科 目：普通物理

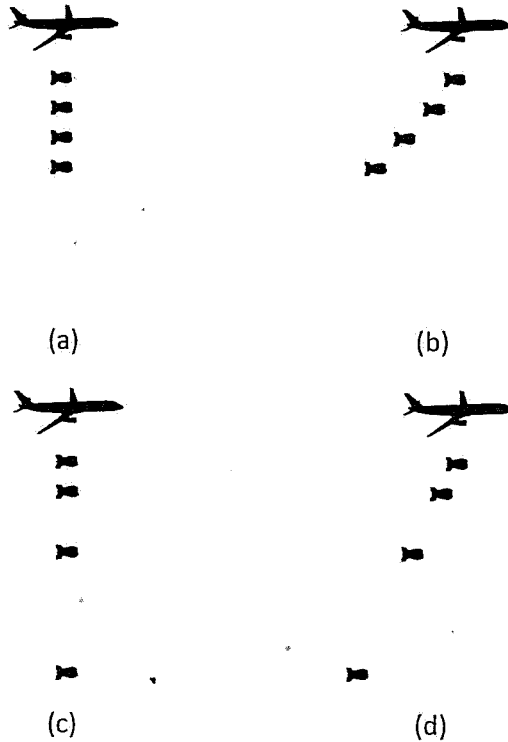
日 期：0201

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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。

1. A bomber dropped a bomb, and an observer stood on the ground looking at the bomber and the bomb. If the drag is not considered, which trajectory of the bomb is correct? (10%) Explain why the other three choices are wrong. (15%)



2. What are the three statements of Kepler's laws of planetary motion? (25%)
3. The Taiwanese satellite FORMOSAT-5 of mass ~ 400 kg (actual 450 kg) is placed into Earth orbit at a height of 700 km (actual 720 km) above the surface.
- Assuming a circular orbit, how long does the FORMOSAT-5 take to complete one orbit? (8%)
 - What is the FORMOSAT-5's speed? (7%)
 - Starting from the satellite on the Earth's surface, what is the minimum energy input necessary to place the FORMOSAT-5 into orbit? Ignore air resistance but include the effect of the planet's daily rotation. (10%)
(Gravity constant $G \sim 6.67 \times 10^{-11} \text{ m}^3 \text{ kg}^{-1} \text{ s}^{-2}$, Earth radius $R_{\oplus} \sim 6370$ km, Earth mass $M_{\oplus} \sim 6 \times 10^{24}$ kg)
4. NASA is giving serious consideration to the concept of solar sailing. A solar sailcraft uses a large, low-mass sail and the energy and momentum of sunlight for propulsion.
- Should the sail be absorbing or reflective? Why? (5%)
 - The total power output of the sun is 3.9×10^{26} Watt. How large a sail is necessary to propel a 10,000-kg spacecraft against the gravitational force of the sun? Express your result in square kilometers. (10%)
 - Explain why your answer to part (b) is independent of the distance from the sun. (10%)