

系所組別： 航空太空工程學系在職專班

考試科目： 航空工程概論（專班）

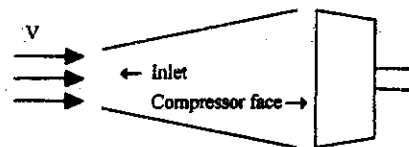
考試日期：0307，節次：3

※ 考生請注意：本試題 可 不可 使用計算機

1. (a.) What is the aerodynamic center (a.c.) of an airfoil?
 (b.) What is the center of pressure (c.p.) of an airfoil?
 (c.) Define incompressible flow and give an airspeed range that allow this assumption to be made for air. (15%)

2. (a.) A Cessna Citation has an equivalent airspeed of 360 Km/hr at an unknown altitude. What is its dynamic pressure?
 (b.) What are the true airspeed (TAS) and indicated airspeed (IAS) of an aircraft? (15%)

3. Air flows into the inlet of a low speed jet with the following properties, $P = 14.5$ psi, $A = 2.65 \text{ ft}^2$, $V = 300 \text{ ft/s}$, and $\rho = 0.0024 \text{ slug/ft}^3$. At the end of the inlet is the compressor face where $P = 15$ psi. Assume the flow is steady, incompressible, one-dimensional and inviscid. (20%)



- (a.) What is the mass flow rate?
- (b.) Determine the area at the compressor face.

(背面仍有題目,請繼續作答)

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4. (30%) Explain briefly the following terms and concepts:

- (a) stresses and strains,
- (b) truss and frame,
- (c) strength and stiffness,
- (d) inertial force and dynamic equilibrium
- (e) CNS/ATM

5. (20%) The figure below shows an airplane flying in the vertical plane and its free body. The forces acting on the plane are its weight W , the thrust T exerted by its engines, and the aerodynamic forces, which are resolved into a component perpendicular to the path, the lift L , and a component parallel to the path, the drag D . The angle γ between the horizontal and the path is called the flight path angle, and α is the angle of attack. If $\gamma = 6^\circ$, $D = 125$ kN, $L = 680$ kN, and the mass of the airplane is 72,000 kg, what values of T and α are necessary to maintain steady flight?

