

# Advanced Aerospace Engineering Principles

Aerospace Engineering · Answer Key · 8 Questions

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**1. In subsonic flight, what does the Kutta condition mathematically dictate at the trailing edge of an airfoil?**

- A) The flow velocity must approach zero
- B) The flow must leave the trailing edge smoothly such that velocity is finite**
- C) The pressure must equal the stagnation pressure
- D) The boundary layer must be fully turbulent

**2. Which structural phenomenon occurs when an aircraft wing undergoes oscillations due to the interaction of aerodynamic, elastic, and inertial forces?**

- A) Creep
- B) Flutter**
- C) Buckling
- D) Fatigue

**3. For a rocket to achieve escape velocity from Earth, its kinetic energy plus its gravitational potential energy must be equal to what value?**

- A) The thrust-to-weight ratio
- B) Zero**
- C) The specific impulse
- D) The orbital inclination

**4. Which dimensionless parameter represents the ratio of inertial forces to viscous forces in fluid flow?**

- A) Mach number
- B) Prandtl number
- C) Reynolds number**
- D) Froude number

**5. In jet engine thermodynamics, what is the primary function of the diffuser section located before the combustion chamber?**

- A) To increase the static pressure by slowing the incoming airflow**
- B) To atomize the fuel for ignition
- C) To accelerate exhaust gases to supersonic speeds
- D) To cool the turbine blades

**6. According to the thin airfoil theory, what is the theoretical slope of the lift coefficient versus angle of attack curve in per radian?**

A) ?

**B) 2?**

C) 4?

D) 1

**7. Which specific impulse (Isp) unit is used to measure the efficiency of rocket propellant, and what is its standard SI unit?**

A) Newtons (N)

**B) Seconds (s)**

C) Joules (J)

D) Meters per second squared ( $\text{m/s}^2$ )

**8. What is the 'Coriolis effect' in the context of ballistics and long-range aerospace flight?**

**A) The bending of a path due to the rotation of the reference frame**

B) The reduction of drag at high altitudes

C) The heating of the leading edge during re-entry

D) The separation of airflow on a curved surface