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- 1) During the ground roll manoeuvre of an aircraft, the force(s) acting on it parallel to the direction of motion
 - a) is thrust alone.
 - b) is drag alone.
 - c) are both thrust and drag.
 - d) are thrust, drag and a part of both weight and lift.
- 2) An aircraft in a steady climb suddenly experiences a 10% drop in thrust. After a new equilibrium is reached at the same speed, the new rate of climb is
 - a) lower by exactly 10%
 - b) lower by more than 10%
 - c) lower by less than 10%
 - d) an unpredictable quantity.
- 3) In an aircraft, the dive manoeuvre can be initiated by
 - a) reducing the engine thrust alone.
 - b) reducing the angle of attack alone.
 - c) generating a nose down pitch rate.
 - d) increasing the engine thrust alone.
- 4) In an aircraft, the elevator control effectiveness determines
 - a) turn radius.
 - b) rate of climb.
 - c) forward-most location of the centre of gravity.
 - d) aft-most location of the centre of gravity.
- 5) The Mach angle for a flow at Mach 2.0 distribution is
 - a) 30°
 - b) 45°
 - c) 60°
 - d) 90°
- 6) For a wing of aspect ratio AR , having an elliptical lift distribution, the induced drag coefficient is (where C_L is the lift coefficient)
 - a) $\frac{C_L}{\pi AR}$
 - b) $\frac{C_L^2}{\pi AR}$
 - c) $\frac{C_L}{2\pi AR}$
 - d) $\frac{C_L^2}{\pi AR^2}$
- 7) Bernoulli's equation is valid under steady state
 - a) only along a streamline in inviscid flow, and between any two points in potential flow.
 - b) between any two points in both inviscid and potential flow.
 - c) between any two points in inviscid flow, and only along a streamline in potential flow.
 - d) only along a streamline in both inviscid and potential flow.
- 8) The ratio of flight speed to the exhaust velocity for maximum propulsion efficiency is
 - a) 0.0
 - b) 0.5

- c) 1.0
 - d) 2.0
- 9) The ideal static pressure coefficient of a diffuser with an area ratio of 2.0 is
- a) 0.25
 - b) 0.50
 - c) 0.75
 - d) 1.0
- 10) A rocket is to be launched from the bottom of a very deep crater on Mars for earth return. The specific impulse of the rocket, measured in seconds, is to be normalized by the acceleration due to gravity at
- a) the bottom of the crater on Mars.
 - b) Mars standard "sea level".
 - c) earth's standard sea level.
 - d) the same depth of the crater on earth.
- 11) In a semi-monocoque construction of an aircraft wing, the skin and spar webs are the primary carriers of
- a) shear stresses due to an aerodynamic moment component alone.
 - b) normal (bending) stresses due to aerodynamic forces.
 - c) shear stresses due to aerodynamic forces alone.
 - d) shear stresses due to aerodynamic forces and a moment component.
- 12) The logarithmic decrement measured for a viscously damped single degree of freedom system is 0.125. The value of the damping factor in % is closest to
- a) 0.5
 - b) 1.0
 - c) 1.5
 - d) 2.0
- 13) The integration $\int_0^1 x^3 dx$ computed using trapezoidal rule with $n = 4$ intervals is _____.