2012-AE-14-26

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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 (2012)
   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 life.
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 (2012)
   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 (2012)
   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 (2012)
   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 ditribution is (2012)
   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) (2012)
   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 (2012)
   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 (2012)
   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 (2012)
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 (2012)
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 (2012)
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 (2012)
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 _____. (2012)