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EE24BTECH11021 - Eshan Ray

1) The constraint $A^2 = A$ on any square matrix A is satisfied for
   a) The identity matrix only.
   b) the null matrix only.
   c) both the identity matrix and null matrix.
   d) no square matrix A
2) The general solution of the differential equation $\frac{d^2y}{dt^2} + \frac{dy}{dt} - 2y = 0$ is
   a) $Ae^{-t} + Be^{2t}$
   b) $Ae^{-2t} + Be^{-t}$
   c) $Ae^{-2t} + Be^{t}$
   d) $Ae^{t} + Be^{2t}$
3) An aircraft in trimmed condition has zero pitching moment at
   a) its aerodynamic centre.
   b) its centre of gravity.
   c) 25% of its mean aerodynamic chord.
   d) 50% od its wing root chord.
4) In an aircraft , constant roll rate can be produced using ailerons by applying
   a) a step input
   b) a ramp input
   c) a sinusoidal input
   d) an impulse input
5) For a symmetric airfoil,the lift coefficient for zero degree angle of attack is
   a) -1.0
   b) 0.0
   c) 0.5
   d) 1.0
6) The critical Mach number of an airfoil is attained when
   a) the freestream Mach number is sonic.
   b) the freestream Mach number is supersonic.
   c) the Mach number somewhere on the airfoil is unity.
   d) the Mach number everywhere on the airfoil is supersonic.
7) The shadowgraph flow visualization technique depends on
   a) the variation of the value of density in the flow
   b) the first derivative of density with respect to spacial coordinate
   c) the second derivative of density with respect to spacial coordinate
   d) the third derivative of density with respect to spacial coordinate
8) The Hohmann ellipse used as earth-Mars transfer orbit has

a) apogee at earth and perigee at Mars
b) both apogee and perigee at earth
c) apogee at Mars and perigee at earth
d) both apogee and perigee at Mars

9) The governing equation for the static transverse deflection of beam under an uniformly distributed load, according to Euler-Bernoulli (*engineering*) beam theory, is a
a) 2^{nd} order linear homogeneous partial differential equation
b) 4^{th} order linear non-homogeneous ordinary differential equation
c) 2^{nd} order linear non-homogeneous ordinary differential equation
d) 4^{th} order nonlinear homogeneous ordinary differential equation

10) The Poisson's ratio, ν of most aircraft grade metallic alloys has values in the range :
a) $-1 \leq \nu \leq 0$
b) $0 \leq \nu 0.2$
c) $0.2 \leq \nu 0.4$
d) $0.4 \leq \nu 0.5$

11) The value of k for which the system of equations $x + 2y + kz = 1$; $2x + +ky + 8z = 3$ hsa no solution is
a) 0
b) 2
c) 4
d) 8

12) If $u(t)$ is a unit step function, the solution of the differential equation $m\frac{d^2y}{dt^2} + kx = u(t)$ in Laplace domain is
a) $\frac{1}{s(ms^2+k)}$
b) $\frac{1}{ms^2+k}$
c) $\frac{s}{ms^2+k}$
d) $\frac{1}{s^2(ms^2+k)}$

13) The general solution of the differential equation $\frac{dy}{dx} - 2\sqrt{y} = 0$ is
a) $y - \sqrt{x} + C = 0$
b) $y - x + C = 0$
c) $\sqrt{y} - \sqrt{x} + C = 0$
d) $\sqrt{y} - x + C = 0$