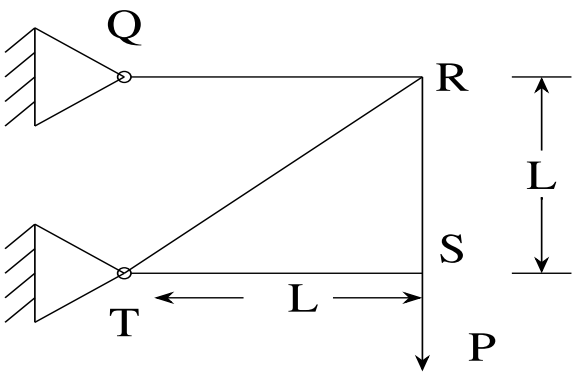
2010-CE-1-13

Golla Shriram - AI24BTech11010

I. Q.1-Q.25 CARRY ONE MARK EACH.

1) The $\lim_{x\to 0} \frac{sin\left[\frac{2}{3}x\right]}{x}$ (2010-CE)
   a) $\frac{2}{3}$
   b) 1
   c) $\frac{3}{2}$
   d) ∞
2) Two coins are simultaneously tossed. The probability of two heads simultaneously appearing is (2010-CE)
   a) $\frac{1}{8}$
   b) $\frac{1}{6}$
   c) $\frac{1}{4}$
   d) $\frac{1}{2}$
3) The order and degree of the differential equation $\frac{d^3y}{dx^3} + 4\sqrt{(\frac{dy}{dx})^3 + y^2} = 0$ (2010-CE)
   a) 3 and 2
   b) 2 and 3
   c) 3 and 3
   d) 3 and 1
4) Two people weighing W each are sitting on a plank of length L floating on water at $\frac{L}{4}$ from either end. Neglecting the weight of the plank. The bending moment at the centre of the plank is (2010-CE)
   a) $\frac{WL}{8}$
   b) $\frac{WL}{16}$
   c) $\frac{WL}{32}$
   d) zero
5) For the truss shown in figure, the force in member QR is (2010-CE)



   a) zero
   b) $\frac{P}{\sqrt{2}}$
   c) P
   d) $\sqrt{2}P$

6) The major and minor principal stresses at a point 3 MPa and -3 MPa respectively. The maximum shear stress at the point is (2010-CE)
   a) zero
   b) 3 MPa
   c) 6 MPa
   d) 9 MPa

7) The number of independent elastic constants for a linear elastic isotropic and homogeneous material is (2010-CE)
   a) 4
   b) 3
   c) 2
   d) 1

8) The effective length of a column of length L fixed against rotation and translation at one end and free at the other end is (2010-CE)
   a) 0.5 L
   b) 0.7 L
   c) 1.414 L
   d) 2 L

9) As per Indian standard code for practice for prestressed concrete (IS:1343-1980) the minimum grades of concerte to be used for post-tensioned and pre-tensioned structural elements are respectively (2010-CE)
   a) M20 for both
   b) M40 and M30
   c) M15 and M20
   d) M30 and M40

10) A solid circular shaft of diameter d and length L is fixed at one end and free at the other end. A torque T is applied at the free end. The shear modulus of the material is G. The angle of twist at the free end is (2010-CE)
   a) $\frac{16TL}{\pi d^4 G}$
   b) $\frac{32TL}{\pi d^4 G}$
   c) $\frac{64TL}{\pi d^4 G}$
   d) $\frac{128TL}{\pi d^4 G}$

11) In a compaction test, G, w, S and e represent the specific gravity, water content, degree of saturation and void ratio of the soil sample, respectively. If γ_w represents the unit weight of water and γ_d represents the dry unit weight of the soil, the equation for zero air voids line is (2010-CE)
   a) $\gamma_d = \frac{G\gamma_w}{1+Se}$
   b) $\gamma_d = \frac{G\gamma_w}{1+Gw}$
   c) $\gamma_d = \frac{Gw}{1+S\gamma_w}$
   d) $\gamma_d = \frac{Gw}{1+Se}$

12) A fine grained soil has liquid limit of 60 and plastic limit of 20. As per the plasticity chart, according to IS classification, the soil is represented by the letter symbols (2010-CE)
   a) CL
   b) CI
   c) CH
   d) CL-ML

13) Quick sand condition occurs when (2010-CE)
   a) the void ratio of the soil becomes 1.0

b) the upward seepage pressure in soil becomes zero
c) the upward seepage pressure in soil becomes equal to the saturated unit weight of the soil
d) the upward seepage pressure in soil becomes equal to the submerged unit weightof the soil