

Name:

Registration number:

Category:

Subject: Solid Mechanics

- Every correct answer carries 1 mark.
- For every incorrect answer, you will get negative marks of 0.25
- There are a total of 10 questions each in Engineering mechanics, maths and Solid mechanics section.

1.	11.	21.
2.	12.	22.
3.	13.	23.
4.	14.	24.
5.	15.	25.
6.	16.	26.
7.	17.	27.
8.	18.	28.
9.	19.	29.
10.	20.	30.

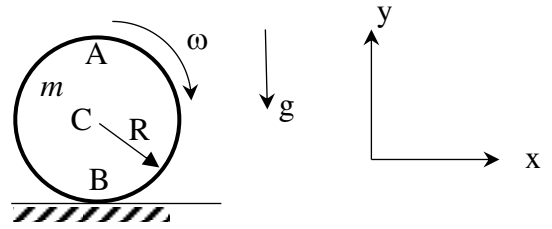
Mechanics

Q1) The location of point P is $(x=1, y=1, z=0)$. The speed of P is 2m/s and the rate of change of speed is 0.2m/s^2 . The centre of curvature of the path taken by P lies at $(1, 2, 0)$ at this instant. Then the acceleration of P, at this instant, is:

- a) $(0.2\mathbf{i} + 4\mathbf{j}) \text{ m/s}^2$ b) $(\pm 0.2\mathbf{i} + 4\mathbf{j}) \text{ m/s}^2$
 c) $(0.2\mathbf{i} \pm 4\mathbf{j}) \text{ m/s}^2$ d) $(\pm 0.2\mathbf{i} \pm 4\mathbf{j}) \text{ m/s}^2$

Q2) A disc of mass m and axial moment of inertia I about the centre of mass C is in plane motion with angular velocity ω . At this instant $|V_A| < 2\omega R$. At this instant the kinetic energy of the disc w.r.t. the ground is:

- a) $\frac{1}{2}m(V_A - \omega R)^2 + \frac{1}{2}I\omega^2$
 b) $\frac{1}{2}m(V_A)^2 + \frac{1}{2}(I + mR^2)\omega^2$
 c) $\frac{1}{2}m(V_A)^2 + \frac{1}{2}I\omega^2$
 d) $\frac{1}{2}(I + mR^2)\omega^2$



Q3.... to Q.10

Mathematics

Q11) The matrix U has eigenvalue λ . If the identity matrix is denoted by I and h is a scalar, the eigenvalue of the matrix $(U + Ih)^{-1}(U - Ih)$ is given by,

- (a) $\frac{\lambda-h}{\lambda+h}$
- (b) $\frac{\lambda+h}{\lambda-h}$
- (c) $\lambda^2 - h^2$
- (d) λh

Q12) Consider a general $n \times n$ matrix U . Suppose the dimension of the null space is denoted by α .

- (a) $rank(U) = n - \alpha$
- (b) $rank(U) = n$
- (c) $rank(U) = n + \alpha$
- (d) None of the above

Q13... to Q.20

Solid Mechanics

(Q21) An incompressible body can change its

- (a) shape and surface area (b) only shape (c) volume (d) none of these

(Q22) How many independent material constants are required for linear stress-strain relation of most general anisotropic elastic materials?

- (a) 36 (b) 2 (c) 21 (d) none of these

Q23... to Q30.