**CBSE Class 11 Physics**

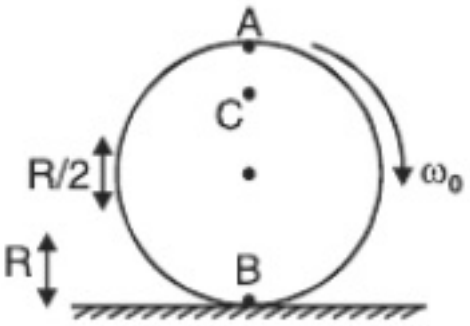
**Practice Paper**

**Chapter-7 (System of Particles and Rotational Motion)**

**3 MARKS QUESTIONS**

1. Derive the three equation of rotational motion
   i. $\omega = \omega_0 + \alpha t$
   ii. $\theta = \omega_0 t + \frac{1}{2}\alpha t^2$
   iii. $\omega^2 = \omega_0^2 + 2\alpha\theta$

   under constant angular acceleration. Here symbols have usual meaning.
2. Obtain an expression for the work done by a torque. Hence write the expression for power.
3. Prove that the rate of change of angular momentum of a system of particles about a reference point is equal to the net torque acting on the system.
4. Derive a relation between angular momentum, moment of inertia and angular velocity of a rigid body.
5. Show that moment of a couple does not depend on the point about which moment is calculated.
6. A disc rotating about its axis with angular speed $\omega_0$ is placed lightly (without any linear push) on a perfectly frictionless table. The radius of the disc is B. What are the linear velocities of the points A, B and C on the dies shown in figure. Will the disc roll?




**Ans.** For A $V_A = R\omega_0$ in forward direction

For B = $V_B = R\omega_0$ in backward direction

For C $V_c = \frac{R}{2}\omega_0$ in forward direction disc will not roll.

7. A uniform circular disc of radius R is rolling on a horizontal surface. Determine the tangential velocity (i) at the upper most point (ii) at the centre of mass and (iii) at the point of contact.
8. Derive an expression for the total work done on a rigid body executing both translational and rotational motions.
9. Prove that the acceleration of a solid cylinder rolling without slipping down an inclined plane is $\frac{2g}{3}\sin\theta$.
10. Show that the angular momentum of a particle is the product of its linear momentum and moment arm. Also show that the angular momentum is produced only by the angular component of linear momentum.

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**Practice Paper**

**Chapter-7 (System of Particles and Rotational Motion)**

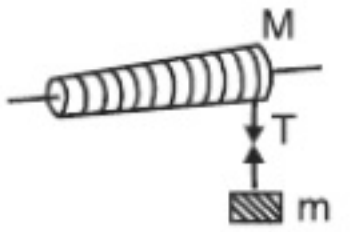
**5 MARK QUESTIONS**

1. Obtain the expression for the linear acceleration of a cylinder rolling down an inclined plane and hence find the condition for the cylinder to roll down without slipping.
2. Prove the result that the velocity V of translation of a rolling body (like a ring, disc, cylinder or sphere) at the bottom of an inclined plane of a height h is given by

$$V^2 = \frac{2gh}{1+\frac{k^2}{R^2}}$$

where K = Radius of gyration of body about its symmetry axis, and R is radius of body. The body starts from rest at the top of the plane.

3. A light string is wound round a cylinder and carries a mass tied to it at the free end. When the mass is released, calculate.




(a) the linear acceleration of the descending mass (b) angular acceleration of the cylinder (c) Tension in the string.

4. State the theorem of
(i) perpendicular axis (ii) parallel axis.
Find the moment of inertia of a rod of mass M and length L about and axis perpendicular to it through one end. Given the moment of inertia about an axis perpendicular to rod and through COM is $\frac{1}{12}$ $ML^2$