

JEE MAIN SYSTEM OF PARTICLES AND ROTATIONAL MOTION — ROLLING MOTION — PYQS

Max. Marks: 24
Questions: 6

Section A (MCQ) — 5 questions

- Q.1** A solid cylinder having radius R and length L is slipping on a rough horizontal plane. At time $t = 0$ the cylinder has a translational velocity $v_0 = 49$ m/s, perpendicular to its axis and a rotational velocity $v_0/4R$ about the centre. The time taken by the cylinder to start rolling is _____ seconds. (coefficient of kinetic friction $\mu_k = 0.25$ and $g = 9.8$ m/s²) [JEE Main 2026 (Online) 8th April Evening Shift]
- (1) 15 (2) 5 (3) 10 (4) 7.5

Scan or tap for the full solution

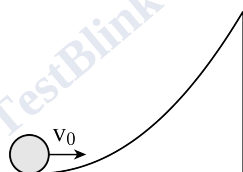


- Q.2** A solid sphere (A) of mass $5m$ and a spherical shell (B) of mass m , both having same radius, are placed on a rough surface. When a force of same magnitude is applied tangentially at the highest points of A and B, they start rolling without slipping with an acceleration of a_A and a_B , respectively. The ratio of a_A and a_B is _____. [JEE Main 2026 (Online) 6th April Evening Shift]
- (1) 5 : 21 (2) 6 : 10 (3) 21 : 25 (4) 1 : 5

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- Q.3** An object of uniform density rolls up the curved path with the initial velocity v_0 as shown in the figure. If the maximum height attained by an object is $\frac{7v_0^2}{10g}$ (g = acceleration due to gravity), the object is a _____. [JEE Main 2026 (Online) 5th April Evening Shift]



- (1) solid cylinder (2) ring
(3) disc (4) solid sphere

Scan or tap for the full solution



- Q.4** A wheel is rolling on a plane surface. The speed of a particle on the highest point of the rim is 8 m/s. The speed of the particle on the rim of the wheel at the same level as the centre of the wheel, will be :

[JEE Main 2025 (Online) 4th April Evening Shift]

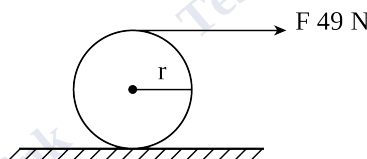
- (1) $4\sqrt{2}$ m/s (2) 8 m/s
(3) 4 m/s (4) $8\sqrt{2}$ m/s

Scan or tap for the full solution



- Q.5** A force of 49 N acts tangentially at the highest point of a sphere (solid) of mass 20 kg, kept on a rough horizontal plane. If the sphere rolls without slipping, then the acceleration of the center of the sphere is

[JEE Main 2025 (Online) 3rd April Morning Shift]

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- (1) 2.5 m/s² (2) 3.5 m/s²
(3) 0.25 m/s² (4) 0.35 m/s²

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Section B (Numerical) — 1 question

- Q.6** A circular ring and a solid sphere having same radius roll down on an inclined plane from rest without slipping. The ratio of their velocities when reached at the bottom of the plane is $\sqrt{\frac{x}{5}}$ where $x =$ _____. [JEE Main 2025 (Online) 4th April Morning Shift]

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ANSWER KEY

Section A (MCQ) — 5 questions

Ques.	1	2	3	4	5						
Ans.	2	1	4	1	2						

Section B (Numerical) — 1 question

Ques.	6				
Ans.	4 or 3.5				