

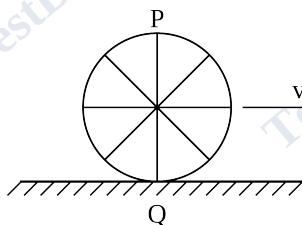
NEET SYSTEM OF PARTICLES AND ROTATIONAL MOTION — ROLLING MOTION — PYQS

Max. Marks: 56
Questions: 14

Section A (MCQ) — 14 questions

- Q.1** A wheel of a bullock cart is rolling on a level road as shown in the figure below. If its linear speed is v in the direction shown, which one of the following options is correct (P and Q are any highest and lowest points on the wheel, respectively)?

[NEET (UG) 2024]



- (1) Point P moves slower than point Q
- (2) Point P moves faster than point Q
- (3) Both the points P and Q move with equal speed
- (4) Point P has zero speed

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- Q.2** A disc of radius 2 m and mass 100 kg rolls on a horizontal floor. Its centre of mass has speed of 20 cm/s. How much work is needed to stop it?

[NEET (UG) 2019]

- (1) 1 J
- (2) 2 J
- (3) 3 J
- (4) 30 kJ

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- Q.3** A solid sphere is in rolling motion. In rolling motion a body possesses translational kinetic energy (K_t) as well as rotational kinetic energy (K_r) simultaneously. The ratio $K_t : (K_t + K_r)$ for the sphere is

[NEET 2018]

- (1) 7 : 10
- (2) 5 : 7
- (3) 10 : 7
- (4) 2 : 5

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- Q.4** A disc and a sphere of same radius but different masses roll off on two inclined planes of the same altitude and length. Which one of the two objects gets to the bottom of the plane first?

[NEET 2016 (Phase 1)]

- (1) Both reach at the same time
- (2) Depends on their masses
- (3) Disc
- (4) Sphere

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- Q.5** The ratio of the accelerations for a solid sphere (mass m and radius R) rolling down an incline of angle θ without slipping and slipping down the incline without rolling is

[AIPMT 2014]

- (1) 5 : 7
- (2) 2 : 3
- (3) 2 : 5
- (4) 7 : 5

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- Q.6** A small object of uniform density rolls up a curved surface with an initial velocity ' v '. It reaches upto a maximum height of $\frac{3v^2}{4g}$ with respect to the initial position. The object is

[NEET 2013]

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

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- Q.7** A solid cylinder of mass 3 kg is rolling on a horizontal surface with velocity 4 m s^{-1} . It collides with a horizontal spring of force constant 200 N m^{-1} . The maximum compression produced in the spring will be

[AIPMT 2012 (Prelims)]

- (1) 0.5 m
- (2) 0.6 m
- (3) 0.7 m
- (4) 0.2 m

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- Q.8** A solid cylinder and a hollow cylinder, both of the same mass and same external diameter are released from the same height at the same time on an inclined plane. Both roll down without slipping. Which one will reach the bottom first?

[AIPMT 2010 (Mains)]

- (1) Both together only when angle of inclination of plane is 45°
 (2) Both together
 (3) Hollow cylinder
 (4) Solid cylinder

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Q.9 A drum of radius R and mass M , rolls down without slipping along an inclined plane of angle θ . The frictional force [AIPMT 2005]

- (1) dissipates energy as heat
 (2) decreases the rotational motion
 (3) decreases the rotational and translational motion
 (4) converts translational energy to rotational energy.

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Q.10 A ball rolls without slipping. The radius of gyration of the ball about an axis passing through its centre of mass is K . If radius of the ball be R , then the fraction of total energy associated with its rotational energy will be [AIPMT 2003]

- (1) $\frac{K^2 + R^2}{R^2}$ (2) $\frac{K^2}{R^2}$
 (3) $\frac{K^2}{K^2 + R^2}$ (4) $\frac{R^2}{K^2 + R^2}$

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Q.11 A solid cylinder of mass M and radius R rolls without slipping down an inclined plane of length L and height h . What is the speed of its centre of mass when the cylinder reaches its bottom ? [AIPMT 2003]

- (1) $\sqrt{2gh}$ (2) $\sqrt{\frac{3}{4}gh}$ (3) $\sqrt{\frac{4}{3}gh}$ (4) $\sqrt{4gh}$

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Q.12 A point P is considered at contact point of a wheel on ground which rolls on ground without slipping then value of displacement of point P when wheel completes half of rotation (if radius of wheel is 1 m) [AIPMT 2002]

- (1) 2 m (2) $\sqrt{\pi^2 + 4}\text{ m}$
 (3) $\pi\text{ m}$ (4) $\sqrt{\pi^2 + 2}\text{ m}$

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Q.13 A disc is rolling, the velocity of its centre of mass is v_{cm} . Which one will be correct? [AIPMT 2001]

- (1) the velocity of the highest point is $2v_{\text{cm}}$ and of the point of contact is zero
 (2) the velocity of the highest point is v_{cm} and of the point of contact is v_{cm}
 (3) the velocity of the highest point is $2v_{\text{cm}}$ and of the point of contact is v_{cm}
 (4) the velocity of the highest point is $2v_{\text{cm}}$ and of the point of contact is $2v_{\text{cm}}$.

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Q.14 For a hollow cylinder and a solid cylinder rolling without slipping on an inclined plane, then which of these reaches earlier [AIPMT 2000]

- (1) solid cylinder (2) hollow cylinder
 (3) both simultaneously (4) can't say anything

Scan or tap for the full solution



ANSWER KEY

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	2	3	2	4	1	2	2	4	4	3	3
Ques.	12	13	14								
Ans.	2	1	1								