

PYQSide

NEET SYSTEM OF PARTICLES AND ROTATIONAL MOTION — KINEMATICS AND DYNAMICS OF ROTATION ABOUT A FIXED AXIS — PYQS

Max. Marks: 64

Questions: 16

Section A (MCQ)

Q.1 The angular speed of a flywheel is increased from 600 rpm to 1200 rpm in 10 s. The number of revolutions completed by the flywheel during this time is : [NEET (UG) 2026]

- (1) 600 (2) 300 (3) 900 (4) 150

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Q.2 The angular speed of a fly wheel moving with uniform angular acceleration changes from 1200 rpm to 3120 rpm in 16 seconds. The angular acceleration in rad/s^2 is [NEET (UG) 2022]

- (1) 2π (2) 4π (3) 12π (4) 104π

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Q.3 An energy of 484 J is spent in increasing the speed of a flywheel from 60 rpm to 360 rpm. The moment of inertia of the flywheel is :

[NEET (UG) 2022 (Phase 2)]

- (1) 0.07 kg m^2 (2) 0.7 kg m^2
(3) 3.22 kg m^2 (4) 30.8 kg m^2

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Q.4 A solid cylinder of mass 2 kg and radius 4 cm is rotating about its axis at the rate of 3 rpm. The torque required to stop after 2π revolutions is :

[NEET (UG) 2019]

- (1) $2 \times 10^{-3} \text{ N m}$ (2) $2 \times 10^{-6} \text{ N m}$
(3) $2 \times 10^6 \text{ N m}$ (4) $12 \times 10^{-4} \text{ N m}$

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Q.5 A rope is wound around a hollow cylinder of mass 3 kg and radius 40 cm. What is the angular acceleration of the cylinder if the rope is pulled with a force of 30 N? [NEET 2017]

- (1) 0.25 rad s^{-2} (2) 25 rad s^{-2}
(3) 5 m s^{-2} (4) 25 m s^{-2}

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Q.6 A uniform circular disc of radius 50 cm at rest is free to turn about an axis which is perpendicular to its plane and passes through its centre. It is subjected to a torque which produces a constant angular acceleration of 2.0 rad s^{-2} . Its net acceleration in m s^{-2} at the end of 2.0 s is approximately [NEET 2016 (Phase 1)]

- (1) 6.0 (2) 3.0 (3) 8.0 (4) 7.0

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Q.7 Two rotating bodies A and B of masses m and $2m$ with moments of inertia I_A and I_B ($I_B > I_A$) have equal kinetic energy of rotation. If L_A and L_B be their angular momenta respectively, then [NEET 2016 (Phase 2)]

- (1) $L_A = \frac{L_B}{2}$ (2) $L_A = 2L_B$
(3) $L_B > L_A$ (4) $L_A > L_B$

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Q.8 A solid sphere of mass m and radius R is rotating about its diameter. A solid cylinder of same mass and same radius is also rotating about its geometrical axis with an angular speed twice that of the sphere. The ratio of their kinetic energies of rotation ($E_{\text{sphere}}/E_{\text{cylinder}}$) will be [NEET 2016 (Phase 2)]

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

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Q.9 An automobile moves on a road with a speed of 54 km h^{-1} . The radius of its wheels is 0.45 m and the moment of inertia of the wheel about its axis of rotation is 3 kg m^2 . If the vehicle is brought to rest in 15 s, the magnitude of average torque transmitted by its brakes to the wheel is [AIPMT 2015]

- (1) $10.86 \text{ kg m}^2 \text{ s}^{-2}$ (2) $2.86 \text{ kg m}^2 \text{ s}^{-2}$
(3) $6.66 \text{ kg m}^2 \text{ s}^{-2}$ (4) $8.58 \text{ kg m}^2 \text{ s}^{-2}$

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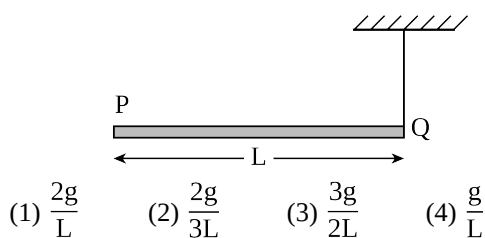


- Q.10** A solid cylinder of mass 50 kg and radius 0.5 m is free to rotate about the horizontal axis. A massless string is wound round the cylinder with one end attached to it and other hanging freely. Tension in the string required to produce an angular acceleration of $2 \text{ revolutions s}^{-2}$ is [AIPMT 2014]
 (1) 25 N (2) 50 N (3) 78.5 N (4) 157 N

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- Q.11** A rod PQ of mass M and length L is hinged at end P. The rod is kept horizontal by a massless string tied to point Q as shown in figure. When string is cut, the initial angular acceleration of the rod is [NEET 2013]



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- Q.12** The instantaneous angular position of a point on a rotating wheel is given by the equation $\theta(t) = 2t^3 - 6t^2$

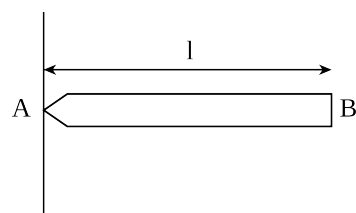
The torque on the wheel becomes zero at

- (1) $t = 1 \text{ s}$ (2) $t = 0.5 \text{ s}$
 (3) $t = 0.25 \text{ s}$ (4) $t = 2 \text{ s}$

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- Q.13** A uniform rod AB of length l and mass m is free to rotate about point A. The rod is released from rest in the horizontal position. Given that the moment of inertia of the rod about A is $\frac{ml^2}{3}$, the initial angular acceleration of the rod will be [AIPMT 2007]



- (1) $\frac{mgl}{2}$ (2) $\frac{3}{2}gl$ (3) $\frac{3g}{2l}$ (4) $\frac{2g}{3l}$

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- Q.14** A uniform rod AB of length l and mass m is free to rotate about point A. The rod is released from rest in the horizontal position. Given that the moment of inertia of the rod about A is $\frac{ml^2}{3}$, the initial angular acceleration of the rod will be [AIPMT 2006]
 (1) $\frac{mgl}{2}$ (2) $\frac{3}{2}gl$ (3) $\frac{3g}{2l}$ (4) $\frac{2g}{3l}$

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- Q.15** Two bodies have their moments of inertia I and 2I respectively about their axis of rotation. If their kinetic energies of rotation are equal, their angular velocity will be in the ratio [AIPMT 2005]
 (1) 2:1 (2) 1:2 (3) $\sqrt{2}:1$ (4) $1:\sqrt{2}$

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- Q.16** A wheel having moment of inertia 2 kg m^2 about its vertical axis, rotates at the rate of 60 rpm about this axis. The torque which can stop the wheel's rotation in one minute would be [AIPMT 2004]
 (1) $\frac{2\pi}{15} \text{ N m}$ (2) $\frac{\pi}{12} \text{ N m}$
 (3) $\frac{\pi}{15} \text{ N m}$ (4) $\frac{\pi}{18} \text{ N m}$

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ANSWER KEY

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	4	2	2	2	2	3	3	2	3	4	3
Ques.	12	13	14	15	16						
Ans.	1	3	3	3	3						