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NEET MOTION IN A PLANE — UNIFORM CIRCULAR MOTION (ANGULAR VELOCITY, CENTRIPETAL ACCELERATION) — PYQS

Max. Marks: 52 **Questions:** 13

Section A (MCQ) — 13 questions

Q.1 A particle moving with uniform speed in a circular path maintains: [NEET (UG) 2024]

(1) Constant velocity

(2) Constant acceleration

(3) Constant velocity but varying acceleration

(4) Varying velocity and varying acceleration

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Q.2 Let ω_1, ω_2 and ω_3 be the angular speed of the second hand, minute hand and hour hand of a smoothly running analog clock, respectively. If x_1, x_2 and x_3 are their respective angular distances in 1 minute then the factor which remains constant (k) is [RE-NEET (UG) 2024]

(1) $\frac{\omega_1}{x_1} = \frac{\omega_2}{x_2} = \frac{\omega_3}{x_3} = k$

(2) $\omega_1 x_1 = \omega_2 x_2 = \omega_3 x_3 = k$

(3) $\omega_1 x_1^2 = \omega_2 x_2^2 = \omega_3 x_3^2 = k$

(4) $\omega_1^2 x_1 = \omega_2^2 x_2 = \omega_3^2 x_3 = k$

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Q.3 Two particles A and B are moving in uniform circular motion in concentric circles of radii r_A and r_B with speed v_A and v_B respectively. Their time period of rotation is the same. The ratio of angular speed of A to that of B will be : [NEET (UG) 2019]

(1) $v_A:v_B$ (2) 1:1 (3) $r_B:r_A$ (4) $r_A:r_B$

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Q.4 A particle moves so that its position vector is given by $\vec{r} = \cos\omega t\,\hat{x} + \sin\omega t\,\hat{y}$, where ω is a constant. Which of the following is true? [NEET 2016 (Phase 1)]

(1) Velocity is perpendicular to $\vec{r}$ and acceleration is directed towards the origin.

(2) Velocity is perpendicular to $\vec{r}$ and acceleration is directed away from the origin.

(3) Velocity and acceleration both are perpendicular to $\vec{r}$

(4) Velocity and acceleration both are parallel to $\vec{r}$

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Q.5 A particle of mass 10 g moves along a circle of radius 6.4 cm with a constant tangential acceleration. What is the magnitude of this acceleration if the kinetic energy of the particle becomes equal to 8×10^{-4} J by the end of the second revolution after the beginning of the motion? [NEET 2016 (Phase 1)]

(1) 0.18 m/s^2 (2) 0.2 m/s^2

(3) 0.1 m/s^2 (4) 0.15 m/s^2

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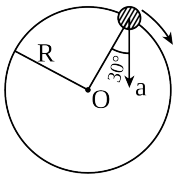
Q.6 In the given figure, a = 15 m s^{-2} represents the total acceleration of particle moving in the clockwise direction in a circle of radius R = 2.5 m at a given instant of time. The speed of the particle is [NEET 2016 (Phase 2)]



(1) 4.5 m s^{-1} (2) 5.0 m s^{-1}

(3) 5.7 m s^{-1} (4) 6.2 m s^{-1}

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Q.7 The position vector of a particle $\vec{R}$ as a function of time is given by $\vec{R} = 4\sin(2\pi t)\hat{i} + 4\cos(2\pi t)\hat{j}$. Where R is in meters, t is in seconds and $\hat{i}$ and $\hat{j}$ denote unit vectors along x-and y-directions, respectively. Which one of the following statements is wrong for the motion of particle? [AIPMT 2015]

(1) Magnitude of the velocity of particle is 8 meter/second.

(2) Path of the particle is a circle of radius 4 meter.

(3) Acceleration vector is along $-\vec{R}$.

(4) Magnitude of acceleration vector is $\frac{v^2}{R}$ where v is the velocity of particle.

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Q.8 A particle moves in a circle of radius 5 cm with constant speed and time period 0.2π s. The acceleration of the particle is [AIPMT 2011 (Prelims)]

(1) 15 m/s^2 (2) 25 m/s^2 (3) 36 m/s^2 (4) 5 m/s^2

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Q.9 A particle moves in x-y plane according to rule $x = a\sin\omega t$ and $y = a\cos\omega t$. The particle follows [AIPMT 2010 (Mains)]

(1) an elliptical path

(2) a circular path

(3) a parabolic path

(4) a straight line path inclined equally to x and y-axes

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Q.10 A car runs at a constant speed on a circular track of radius 100 m, taking 62.8 seconds for every circular lap. The average velocity and average speed for each circular lap respectively is [AIPMT 2006]

(1) 10 m/s, 0 (2) 0, 0

(3) 0, 10 m/s (4) 10 m/s, 10 m/s.

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Q.11 A stone tied to the end of a string of 1 m long is whirled in a horizontal circle with a constant speed. If the stone makes 22 revolutions in 44 seconds, what is the magnitude and direction of acceleration of the stone? [AIPMT 2005]

(1) π^2 m s^{-2}
and direction along the radius towards the centre

(2) π^2 m s^{-2}
and direction along the radius away from the centre

(3) π^2 m s^{-2}
and direction along the tangent to the circle

(4) $\pi^2/4$ m s^{-2}
and direction along the radius towards the centre.

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Q.12 A particle moves along a circle of radius $\left(\frac{20}{\pi}\right)$ m with constant tangential acceleration. If the velocity of the particle is 80 m/s at the end of the second revolution after motion has begun, the tangential acceleration is [AIPMT 2003]

(1) 40 m/s^2 (2) 640π m/s^2

(3) 160π m/s^2 (4) 40π m/s^2

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Q.13 Two particles having mass M and m are moving in a circular path having radius R and r. If their time periods are the same, then the ratio of their angular velocities will be [AIPMT 2001]

(1) $\frac{r}{R}$ (2) $\frac{R}{r}$ (3) 1 (4) $\sqrt{\frac{R}{r}}$

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ANSWER KEY

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