

Prayas JEE (2025)

Physics

DPP: 3

Oscillations

Q1 A simple harmonic oscillation has an amplitude A and time period T . The time required to travel from $x = A$ to $x = \frac{A}{2}$ is

- (A) $\frac{T}{6}$
 (B) $\frac{T}{4}$
 (C) $\frac{T}{3}$
 (D) $\frac{T}{12}$

Q2 A particle is executing SHM with time period T . The time taken by it to travel from mean position to $\frac{1}{\sqrt{2}}$ times its amplitude is equal to

- (A) $\frac{T}{6}$
 (B) $\frac{T}{12}$
 (C) $\frac{T}{8}$
 (D) $\frac{T}{4}$

Q3 Which one of the following statements is true for the speed v and the acceleration a of a particle executing simple harmonic motion?

- (A) When v is maximum, a is maximum.
 (B) Value of a is zero, whatever may be the value of v .
 (C) When v is zero, a is zero.
 (D) When v is maximum, a is zero.

Q4 The phase difference between the instantaneous velocity and acceleration of a particle executing simple harmonic motion is:

- (A) 0.5π
 (B) π
 (C) 0.707π
 (D) zero

Q5

The average velocity of a particle executing SHM in one complete vibration is:

- (A) zero
 (B) $\frac{A\omega}{2}$
 (C) $A\omega$
 (D) $\frac{A\omega^2}{2}$

Q6 Two simple harmonic motions are given by $y_1 = a \sin\left[\left(\frac{\pi}{2}\right)t + \phi\right]$ and $y_2 = b \sin\left[\left(\frac{2\pi}{3}\right)t + \phi\right]$. The phase difference between these after 1 s is

- (A) Zero
 (B) $\frac{\pi}{2}$
 (C) $\frac{\pi}{4}$
 (D) $\frac{\pi}{6}$

Q7 Which of the following is not simple harmonic function?

- (A) $y = a \sin 2\omega t + b \cos^2 \omega t$
 (B) $y = a \sin \omega t + b \cos 2\omega t$
 (C) $y = 1 - 2 \sin^2 \omega t$
 (D) $y = (\sqrt{a^2 + b^2}) \sin \omega t \cos \omega t$

Q8 The displacement of a particle varies according to the relation $y = 4(\cos \pi t + \sin \pi t)$. The amplitude of the particle is

- (A) 8 units
 (B) 2 units
 (C) 4 units
 (D) $4\sqrt{2}$ units

Q9 A S.H.M. is represented by $x = 5\sqrt{2}(\sin 2\pi t + \cos 2\pi t)$. The amplitude of the S.H.M. is



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- (A) 10 cm
- (B) 20 cm
- (C) $5\sqrt{2}$ cm
- (D) 50 cm

Q10 For a particle undergoing simple harmonic motion, the velocity is plotted against displacement. The curve will be

- (A) a straight line
- (B) a parabola
- (C) a circle
- (D) an ellipse



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Answer Key

Q1 (A)

Q2 (C)

Q3 (D)

Q4 (A)

Q5 (A)

Q6 (D)

Q7 (B)

Q8 (D)

Q9 (A)

Q10 (D)



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