

## Prayas JEE (2025)

## Physics

## Oscillations

DPP: 1

**Q1** The equation of motion of a particle executing S.H.M. where letters have usual meaning is:

- (A)  $\frac{d^2x}{dt^2} = -\frac{k}{m}x$   
 (B)  $\frac{d^2x}{dt^2} = +\omega^2x$   
 (C)  $\frac{d^2x}{dt^2} = -\omega^2x^2$   
 (D)  $\frac{d^2x}{dt^2} = -kmx$

**Q2** The equation of motion of a particle executing SHM is  $\left(\frac{d^2x}{dt^2}\right) + kx = 0$ . The time period of the particle will be:

- (A)  $2\pi/\sqrt{k}$   
 (B)  $2\pi/k$   
 (C)  $2\pi k$   
 (D)  $2\pi\sqrt{k}$

**Q3** Which of the following equation does not represent a simple harmonic motion:

- (A)  $y = a \sin \omega t$   
 (B)  $y = b \cos \omega t$   
 (C)  $y = a \sin \omega t + b \cos \omega t$   
 (D)  $y = a \tan \omega t$

**Q4** The displacement of a particle in S.H.M. is indicated by equation  $y = 10 \sin(20t + \pi/3)$  where  $y$  is in metres. The value of time period of vibration will be (in seconds):

- (A)  $10/\pi$   
 (B)  $\pi/10$   
 (C)  $2\pi/10$   
 (D)  $10/2\pi$

**Q5** The value of phase at maximum displacement from the mean position of a particle in S.H.M. is:

- (A)  $\pi/2$  (B)  $\pi$   
 (C) Zero (D)  $2\pi$

**Q6** The equation of a simple harmonic motion is  $x = 0.34 \cos(3000t + 0.74)$ . Where  $x$  and  $t$  are in mm and sec. respectively. The frequency of the motion is:

- (A) 3000  
 (B)  $3000/2\pi$   
 (C)  $0.74/2\pi$   
 (D)  $3000/\pi$

**Q7** The acceleration of a particle executing S.H.M. is

- (A) Always directed towards the equilibrium position  
 (B) Always towards the one end  
 (C) Continuously changing in direction  
 (D) Maximum at the mean position

**Q8** The distance covered by a particle executing SHM, in one time period is equal to:

- (A) Four times the amplitude  
 (B) Two times the amplitude  
 (C) One times the amplitude  
 (D) Eight times the amplitude

**Q9** The phase of a particle in S.H.M. is  $\pi/2$ , then:

- (A) Its velocity will be maximum.  
 (B) Its acceleration will be minimum.  
 (C) Restoring force on it will be minimum.  
 (D) Its displacement will be maximum.

**Q10** The displacement of a particle in S.H.M. is indicated by equation  $y = 10 \sin(20t + \pi/3)$


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where  $y$  is in metres. The value of maximum velocity of the particle will be:

- (A) 100 m/sec.
- (B) 150 m/sec.
- (C) 200 m/sec.
- (D) 400 m/sec.

**Q11** The displacement of a particle in S.H.M. is indicated by equation  $y = 10 \sin(20t + \pi/3)$  where  $y$  is in metres. The value of phase constant will be:

- (A) Zero
- (B)  $45^\circ$
- (C)  $60^\circ$
- (D)  $30^\circ$

**Q12** The phase difference between the displacement and acceleration of particle executing S.H.M. in radian is:

- (A)  $\pi/4$
- (B)  $\pi/2$
- (C)  $\pi$
- (D)  $2\pi$

**Q13** The phase difference in radians between displacement and velocity in S.H.M. is

- (A)  $\pi/4$
- (B)  $\pi/2$
- (C)  $\pi$
- (D)  $2\pi$



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## Answer Key

Q1 (A)

Q2 (A)

Q3 (D)

Q4 (B)

Q5 (A)

Q6 (B)

Q7 (A)

Q8 (A)

Q9 (D)

Q10 (C)

Q11 (C)

Q12 (C)

Q13 (B)



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