

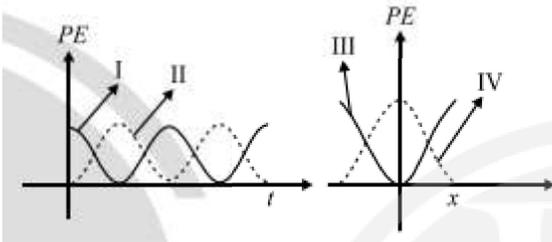
Prayas JEE (2025)

Physics

Oscillations

DPP: 6

- Q1** For a particle executing S.H.M. the displacement x is given by $A \cos \omega t$. Identify the graph which represents the variation of potential energy (P.E.) as a function of time t and displacement x .



- (A) I, III
(B) II, IV
(C) II, III
(D) I, IV
- Q2** A spring of force constant k is cut into lengths of ratio 1 : 2 : 3. They are connected in series and the new force constant is k' . Then they are connected in parallel and force constant is k'' . Then $k' : k''$ is
- (A) 1 : 9
(B) 1 : 11
(C) 1 : 14
(D) 1 : 6
- Q3** A particle executes linear simple harmonic motion with an amplitude of 3 cm. When the particle is at 2 cm from the mean position, the magnitude of its velocity is equal to that of its acceleration. Then its time period in seconds is
- (A) $\frac{\sqrt{5}}{2\pi}$
(B) $\frac{4\pi}{\sqrt{5}}$
(C) $\frac{2\pi}{\sqrt{3}}$
(D) $\frac{\sqrt{5}}{\pi}$
- Q4** A particle of mass m oscillates along x -axis according to equation $x = a \sin \omega t$. The nature

of the graph between momentum and displacement of the particle is

- (A) Circle
(B) Hyperbola
(C) Ellipse
(D) Straight line passing through origin

- Q5** The period of oscillation of a mass M suspended from a spring of negligible mass is T . If along with it another mass M is also suspended, the period of oscillation will now be

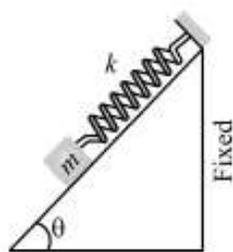
- (A) T
(B) $\frac{T}{\sqrt{2}}$
(C) $2T$
(D) $\sqrt{2}T$

- Q6** A mass M is suspended from a massless spring. An additional mass m stretches the spring further by a distance x . The combined mass will oscillate with a period

- (A) $2\pi \sqrt{\left\{ \frac{(M+m)x}{mg} \right\}}$
(B) $2\pi \sqrt{\left\{ \frac{mg}{(M+m)x} \right\}}$
(C) $2\pi \sqrt{\left\{ \frac{(M+m)}{mgx} \right\}}$
(D) $\frac{\pi}{2} \sqrt{\left\{ \frac{mg}{(M+m)x} \right\}}$

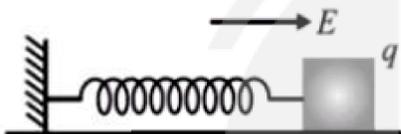
- Q7** In the figure shown the time period and the amplitude respectively, when m is left from rest when spring is relaxed are (the inclined plane is smooth)


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- (A) $2\pi\sqrt{\frac{m}{k}}, \frac{mg \sin \theta}{k}$
 (B) $2\pi\sqrt{\frac{m \sin \theta}{k}}, \frac{2mg \sin \theta}{k}$
 (C) $2\pi\sqrt{\frac{m}{k}}, \frac{mg \cos \theta}{k}$
 (D) None of these

- Q8** A spring-block system shown in figure oscillates with a certain time period. If charge q is given to the block and a uniform field E is switched on, then its time period of oscillation



- (A) Increases
 (B) Decreases
 (C) May increase or decrease
 (D) Remains the same
- Q9** A particle is executing linear S.H.M. between $[x = -A \text{ to } x = A]$. The time taken to go from 0 to $A/2$ is T_1 and to go from $A/2$ to A is T_2 , then
- (A) $T_1 < T_2$
 (B) $T_1 > T_2$
 (C) $T_1 = T_2$
 (D) $T_1 = 2T_2$



Answer Key

Q1 (A)

Q2 (B)

Q3 (B)

Q4 (C)

Q5 (D)

Q6 (A)

Q7 (A)

Q8 (D)

Q9 (A)



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