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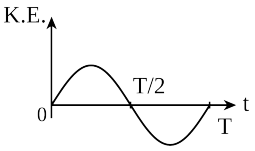
NEET OSCILLATIONS — PYQS

Max. Marks: 240 **Questions:** 60

Section A (MCQ) — 60 questions

Q.1 For a simple pendulum, having time period T, the variation of kinetic energy (K.E.) with time (t) is represented by : [NEET (UG) 2026]

(1)


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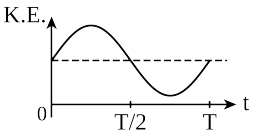

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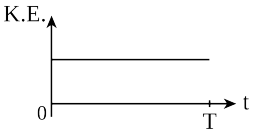

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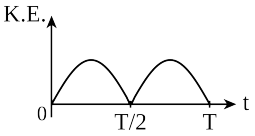

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Q.2 The sum of kinetic energy and potential energy of a simple pendulum bob is 0.02 joule. The speed of the simple pendulum bob at equilibrium position is approximately :
(Consider mass of the bob = 20 g)
[NEET (UG) 2026]

(1) 2.0 m/s (2) 0.2 m/s
(3) 14.1 m/s (4) 1.41 m/s

Scan or tap for the full solution

Q.3 Savitha, a XI standard student, while conducting an experiment to determine the effective length of a simple pendulum L, notes down the data of time taken to complete 30 oscillations as 60 s and hence calculates the length of the simple pendulum as :
(Take $\pi^2 = 9.8$, and $g = 9.8\ m/s^2$) [NEET (UG) 2026]
(1) 0.75 m (2) 1 m (3) 1.5 m (4) 2 m

Scan or tap for the full solution

Q.4 A cylindrical cork of uniform density floats in a liquid of density ρ_1. If the cork is depressed slightly and released, it oscillates harmonically with time period T. If the same cork floats in another liquid of density ρ_2, then the similar oscillation has time period 2T. The value of ρ_2/ρ_1 is:
[RE-NEET (UG) 2026]

(1) 1/4 (2) 4 (3) 2 (4) 1/2

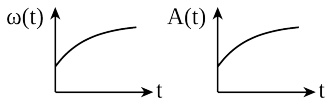
Scan or tap for the full solution

Q.5 Consider a spring-mass simple harmonic oscillator in one dimension. The mass of the particle is m kg and the spring constant is k Nm^{-1}. At a given instant, the extension of the spring is x-meter and the speed of the particle is v ms^{-1}. On the x − v plane, if the graph of v as a function of x is a circle, then the correct option is: [RE-NEET (UG) 2026]

(1) $k = \sqrt{m}$ (2) $k = \frac{1}{m}$
(3) k = m (4) $k = m^2$

Scan or tap for the full solution

Q.6 In an oscillating spring mass system, a spring is connected to a box filled with sand. As the box oscillates, sand leaks slowly out of the box vertically so that the average frequency ω(t) and average amplitude A(t) of the system change with time t. Which one of the following options schematically depicts these changes correctly?
[NEET (UG) 2025]

(1)


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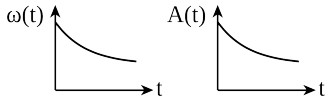

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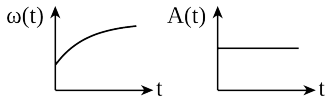

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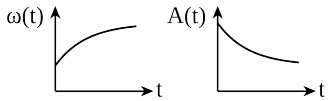

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Q.7 Two identical point masses P and Q, suspended from two separate massless springs of spring constants k_1 and k_2, respectively, oscillate vertically. If their maximum speeds are the same, the ratio (A_Q/A_P) of the amplitude A_Q of mass Q to the amplitude A_P of mass P is [NEET (UG) 2025]

(1) $\sqrt{\frac{k_2}{k_1}}$ (2) $\sqrt{\frac{k_1}{k_2}}$ (3) $\frac{k_2}{k_1}$ (4) $\frac{k_1}{k_2}$

Scan or tap for the full solution

Q.8 If $x = 5\sin\left(\pi t + \frac{\pi}{3}\right)$ m represents the motion of a particle executing simple harmonic motion, the amplitude and time period of motion, respectively, are [NEET (UG) 2024]

(1) 5 cm, 2 s (2) 5 m, 2 s
(3) 5 cm, 1 s (4) 5 m, 1 s

Scan or tap for the full solution

Q.9 If the mass of the bob in a simple pendulum is increased to thrice its original mass and its length is made half its original length, then the new time period of oscillation is $\frac{x}{2}$ times its original time period. Then the value of x is: [NEET (UG) 2024]

(1) $\sqrt{3}$ (2) $\sqrt{2}$ (3) $2\sqrt{3}$ (4) 4

Scan or tap for the full solution

Q.10 A particle executing simple harmonic motion with amplitude A has the same potential and kinetic energies at the displacement [RE-NEET (UG) 2024]

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

Scan or tap for the full solution

Q.11 The two-dimensional motion of a particle, described by $\vec{r} = (\hat{i} + 2\hat{j})A\cos\omega t$ is a/an:

A. parabolic path
B. elliptical path
C. periodic motion
D. simple harmonic motion

Choose the correct answer from the options given below: [RE-NEET (UG) 2024]

(1) B, C and D only (2) A, B and C only
(3) A, C and D only (4) C and D only

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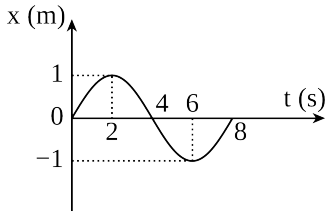
Q.12 The x-t graph of a particle performing simple harmonic motion is shown in the figure. The acceleration of the particle at t = 2 s is : [NEET (UG) 2023]



(1) $-\frac{\pi^2}{8}$ m s^{-2} (2) $\frac{\pi^2}{16}$ m s^{-2}
(3) $-\frac{\pi^2}{16}$ m s^{-2} (4) $\frac{\pi^2}{8}$ m s^{-2}

Scan or tap for the full solution

Q.13 Two pendulums of length 121 cm and 100 cm start vibrating in phase. At some instant, the two are at their mean position in the same phase. The minimum number of vibrations of the shorter pendulum after which the two are again in phase at the mean position is : [NEET (UG) 2022]

(1) 11 (2) 9 (3) 10 (4) 8

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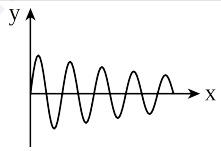
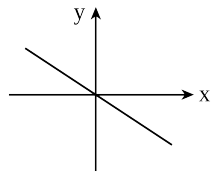
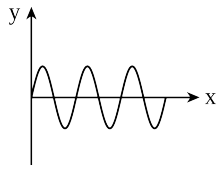
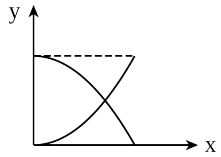
Q.14 Match **List-I** with **List-II**

List-I (x-y graphs)	
a.	
b.	
c.	
d.	

List-II (Situations)	
i.	Total mechanical energy is conserved
ii.	Bob of a pendulum is oscillating under negligible air friction
iii.	Restoring force of a spring
iv.	Bob of a pendulum is oscillating along with air friction

Choose the correct answer from the options given below [NEET (UG) 2022 (Phase 2)]

(1) (a)-(iii), (b)-(ii), (c)-(i), (d)-(iv)

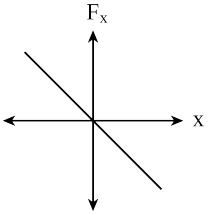
(2) (a)-(iv), (b)-(ii), (c)-(iii), (d)-(i)

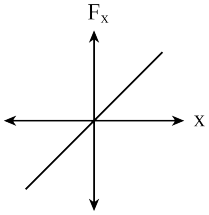
(3) (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)

(4) (a)-(i), (b)-(iv), (c)-(iii), (d)-(ii)

Solution

Q.15 The restoring force of a spring with a block attached to the free end of the spring is represented by [NEET (UG) 2022 (Phase 2)]

(1)


(2)


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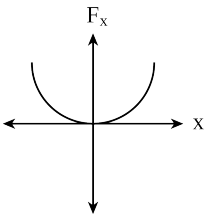

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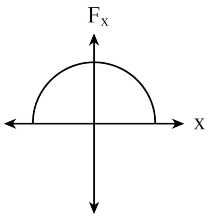

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Q.16 Identify the function which represents a non-periodic motion. [NEET (UG) 2022 (Phase 2)]

(1) $\sin(\omega t + \pi/4)$ (2) $e^{-\omega t}$

(3) $\sin \omega t$ (4) $\sin \omega t + \cos \omega t$

Scan or tap for the full solution

Q.17 A body is executing simple harmonic motion with frequency 'n', the frequency of its potential energy is : [NEET (UG) 2021]

(1) 4n (2) n (3) 2n (4) 3n

Scan or tap for the full solution

Q.18 A spring is stretched by 5 cm by a force 10 N. The time period of the oscillations when a mass of 2 kg is suspended by it is - [NEET (UG) 2021]

(1) 0.628 s (2) 0.0628 s

(3) 6.28 s (4) 3.14 s

Scan or tap for the full solution

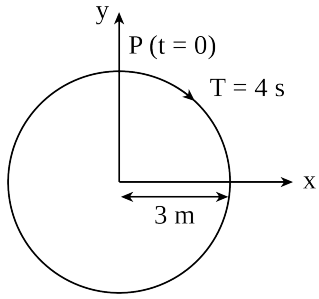
Q.19 The phase difference between displacement and acceleration of a particle in a simple harmonic motion is : [NEET (UG) 2020]

(1) $\frac{3\pi}{2}$ rad (2) $\frac{\pi}{2}$ rad

(3) zero (4) π rad

Scan or tap for the full solution

Q.20 The radius of circle, the period of revolution, initial position and sense of revolution are indicated in the figure.



y- projection of the radius vector of rotating particle P is : [NEET (UG) 2019]

(1) $y(t) = 4\sin\left(\frac{\pi t}{2}\right)$, where y in m

(2) $y(t) = 3\cos\left(\frac{3\pi t}{2}\right)$, where y in m

(3) $y(t) = 3\cos\left(\frac{\pi t}{2}\right)$, where y in m

(4) $y(t) = -3\cos 2\pi t$, where y in m

Solution

Q.21 Average velocity of a particle executing SHM in one complete vibration is : [NEET (UG) 2019]

(1) $A\omega$ (2) $\frac{A\omega^2}{2}$ (3) $\frac{A\omega}{2}$ (4) zero

Scan or tap for the full solution

Q.22 The displacement of a particle executing simple harmonic motion is given by

$y = A_0 + A\sin\omega t + B\cos\omega t$.

Then the amplitude of its oscillation is given by : [NEET (UG) 2019]

(1) $\sqrt{A^2 + B^2}$ (2) A + B

(3) $A + \sqrt{A^2 + B^2}$ (4) $\sqrt{A_0^2 + (A+B)^2}$

Scan or tap for the full solution

Q.23 A pendulum is hung from the roof of a sufficiently high building and is moving freely to and fro like a simple harmonic oscillator. The acceleration of the bob of the pendulum is 20 m s^{-2} at a distance of 5 m from the mean position. The time period of oscillation is [NEET 2018]

(1) 2π s (2) π s (3) 2 s (4) 1 s

Scan or tap for the full solution

Q.24 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 [NEET 2017]

(1) 1:9 (2) 1:11 (3) 1:14 (4) 1:6

Scan or tap for the full solution

Q.25 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 second is [NEET 2017]

(1) $\frac{\sqrt{5}}{2\pi}$ (2) $\frac{4\pi}{\sqrt{5}}$ (3) $\frac{2\pi}{\sqrt{3}}$ (4) $\frac{\sqrt{5}}{\pi}$

Scan or tap for the full solution

Q.26 A body of mass m is attached to the lower end of a spring whose upper end is fixed. The spring has negligible mass. When the mass m is slightly pulled down and released, it oscillates with a time period of 3 s. When the mass m is increased by 1 kg, the time period of oscillations becomes 5 s. The value of m in kg is [NEET 2016 (Phase 2)]

(1) $\frac{3}{4}$ (2) $\frac{4}{3}$ (3) $\frac{16}{9}$ (4) $\frac{9}{16}$

Scan or tap for the full solution

Q.27 A particle is executing a simple harmonic motion. Its maximum acceleration is α and maximum velocity is β. Then, its time period of vibration will be [AIPMT 2015]

(1) $\frac{\beta^2}{\alpha}$ (2) $\frac{2\pi\beta}{\alpha}$ (3) $\frac{\beta^2}{\alpha^2}$ (4) $\frac{\alpha}{\beta}$

Scan or tap for the full solution

Q.28 A particle is executing SHM along a straight line. Its velocities at distances x_1 and x_2 from the mean position are V_1 and V_2 respectively. Its time period is [AIPMT 2015 (Cancelled)]

(1) $2\pi\sqrt{\frac{V_1^2+V_2^2}{x_1^2+x_2^2}}$ (2) $2\pi\sqrt{\frac{V_1^2-V_2^2}{x_1^2-x_2^2}}$

(3) $2\pi\sqrt{\frac{x_1^2+x_2^2}{V_1^2+V_2^2}}$ (4) $2\pi\sqrt{\frac{x_2^2-x_1^2}{V_1^2-V_2^2}}$

Scan or tap for the full solution

Q.29 When two displacements represented by $y_1 = a\sin(\omega t)$ and $y_2 = b\cos(\omega t)$ are superimposed the motion is [AIPMT 2015 (Cancelled)]

(1) simple harmonic with amplitude $\sqrt{a^2+b^2}$

(2) simple harmonic with amplitude $\frac{(a+b)}{2}$

(3) not a simple harmonic

(4) simple harmonic with amplitude $\frac{a}{b}$

Scan or tap for the full solution

Q.30 The oscillation of a body on a smooth horizontal surface is represented by the equation,

$X = A\cos(\omega t)$

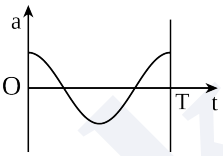
where X = displacement at time t

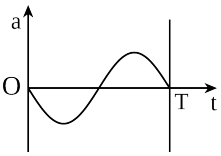
ω = frequency of oscillation

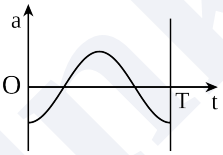
Which one of the following graphs shows correctly the variation of a with t?

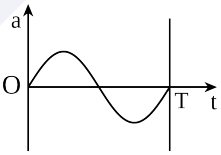
Here a = acceleration at time t

T = time period [AIPMT 2014]

(1) 

(2) 

(3) 

(4) 

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Q.31 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 [NEET 2013 (Karnataka)]

(1) Circle

(2) Hyperbola

(3) Ellipse

(4) Straight line passing through origin

Scan or tap for the full solution

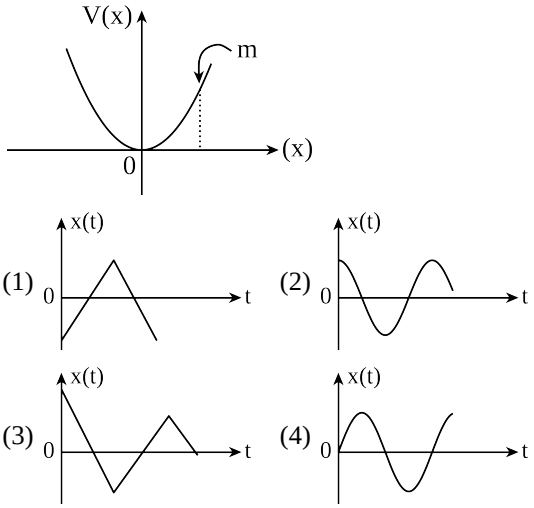
Q.32 Two particles are oscillating along two close parallel straight lines side by side, with the same frequency and amplitudes. They pass each other, moving in opposite directions when their displacement is half of the amplitude. The mean positions of the two particles lie on a straight line perpendicular to the paths of the two particles. The phase difference is [AIPMT 2011 (Mains)]

(1) $\frac{\pi}{6}$ (2) 0 (3) $\frac{2\pi}{3}$ (4) π

Scan or tap for the full solution

Q.33 A particle of mass m is released from rest and follows a parabolic path as shown. Assuming that the displacement of the mass from the origin is small, which graph correctly depicts the position of the particle as a function of time?

[AIPMT 2011 (Prelims)]



Scan or tap for the full solution

Q.34 Out of the following functions representing motion of a particle which represents SHM

(1) $y = \sin \omega t - \cos \omega t$

(2) $y = \sin^3 \omega t$

(3) $y = 5\cos\left(\frac{3\pi}{4} - 3\omega t\right)$

(4) $y = 1 + \omega t + \omega^2 t^2$ [AIPMT 2011 (Prelims)]

(1) Only (1)

(2) Only (4) does not represent SHM

(3) Only (1) and (3)

(4) Only (1) and (2)

Scan or tap for the full solution

Q.35 The displacement of a particle along the x-axis is given by $x = a\sin^2 \omega t$. The motion of the particle corresponds to [AIPMT 2010 (Prelims)]

(1) simple harmonic motion of frequency ω/π

(2) simple harmonic motion of frequency $3\omega/2\pi$

(3) non simple harmonic motion

(4) simple harmonic motion of frequency $\omega/2\pi$

Scan or tap for the full solution

Q.36 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 [AIPMT 2010 (Prelims)]

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

Scan or tap for the full solution

Q.37 A simple pendulum performs simple harmonic motion about x = 0 with an amplitude a and time period T. The speed of the pendulum at x = a/2 will be [AIPMT 2009]

(1) $\frac{\pi a}{T}$ (2) $\frac{3\pi^2 a}{T}$

(3) $\frac{\pi a\sqrt{3}}{T}$ (4) $\frac{\pi a\sqrt{3}}{2T}$

Scan or tap for the full solution

Q.38 Which one of the following equations of motion represents simple harmonic motion ? where k, k_0, k_1 and a are all positive. [AIPMT 2009]

(1) Acceleration = $-k(x + a)$

(2) Acceleration = $k(x + a)$

(3) Acceleration = $-\omega^2 x$

(4) Acceleration = $-k_0 x + k_1 x^2$

Solution

Q.39 Two simple harmonic motions of angular frequency 100 and 1000 rad s^{-1} have the same displacement amplitude. The ratio of their maximum acceleration is [AIPMT 2008]

(1) $1:10^3$ (2) $1:10^4$ (3) 1:10 (4) $1:10^2$

Scan or tap for the full solution

Q.40 A point performs simple harmonic oscillation of period T and the equation of motion is given by $x = a\sin(\omega t + \pi/6)$. After the elapse of what fraction of the time period the velocity of the point will be equal to half of its maximum velocity? [AIPMT 2008]

(1) T/3 (2) T/12 (3) T/8 (4) T/6

Scan or tap for the full solution

Q.41 A particle executes simple harmonic oscillation with an amplitude a. The period of oscillation is T. The minimum time taken by the particle to travel half of the amplitude from the equilibrium position is [AIPMT 2007]

(1) T/8 (2) T/12 (3) T/2 (4) T/4

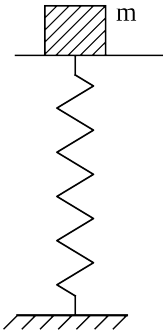
Scan or tap for the full solution

Q.42 The phase difference between the instantaneous velocity and acceleration of a particle executing simple harmonic motion is [AIPMT 2007]

(1) π (2) $0.707\,\pi$ (3) zero (4) $0.5\,\pi$

Scan or tap for the full solution

Q.43 A mass of 2.0 kg is put on a flat pan attached to a vertical spring fixed on the ground as shown in the figure. The mass of the spring and the pan is negligible.
When pressed slightly and released the mass executes a simple harmonic motion. The spring constant is 200 N/m. What should be the minimum amplitude of the motion so that the mass gets detached from the pan (take g = 10 m/s^2). [AIPMT 2007]



(1) 10.0 cm
(2) any value less than 12.0 cm
(3) 4.0 cm
(4) 8.0 cm

Solution

Q.44 The particle executing simple harmonic motion has a kinetic energy $K_0\cos^2\omega t$. The maximum values of the potential energy and the total energy are respectively [AIPMT 2007]
(1) $K_0/2$ and K_0 (2) K_0 and $2K_0$
(3) K_0 and K_0 (4) 0 and $2K_0$

Scan or tap for the full solution

Q.45 A rectangular block of mass m and area of cross-section A floats in a liquid of density ρ. If it is given a small vertical displacement from equilibrium it undergoes oscillation with a time period T, then [AIPMT 2006]
(1) $T \propto \frac{1}{\sqrt{m}}$ (2) $T \propto \sqrt{\rho}$
(3) $T \propto \frac{1}{\sqrt{A}}$ (4) $T \propto \frac{1}{\rho}$

Scan or tap for the full solution

Q.46 The circular motion of a particle with constant speed is [AIPMT 2005]
(1) periodic but not simple harmonic
(2) simple harmonic but not periodic
(3) periodic and simple harmonic
(4) neither periodic nor simple harmonic

Scan or tap for the full solution

Q.47 A particle executing simple harmonic motion of amplitude 5 cm has maximum speed of 31.4 cm/s. The frequency of its oscillation is [AIPMT 2004]
(1) 4 Hz (2) 3 Hz (3) 2 Hz (4) 1 Hz

Scan or tap for the full solution

Q.48 Two springs of spring constants k_1 and k_2 are joined in series. The effective spring constant of the combination is given by [AIPMT 2004]
(1) $\sqrt{k_1k_2}$ (2) $(k_1 + k_2)/2$
(3) $k_1 + k_2$ (4) $k_1k_2/(k_1 + k_2)$

Scan or tap for the full solution

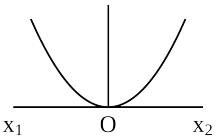
Q.49 Which one of the following statements is true for the speed v and the acceleration a of a particle executing simple harmonic motion? [AIPMT 2003]
(1) When v is maximum, a is maximum
(2) Value of a is zero, whatever may be the value of v.
(3) When v is zero, a is zero
(4) When v is maximum, a is zero.

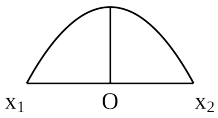
Scan or tap for the full solution

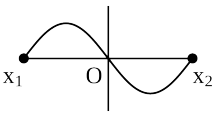
Q.50 The potential energy of a simple harmonic oscillator when the particle is half way to its end point is [AIPMT 2003]
(1) $\frac{2}{3}E$ (2) $\frac{1}{8}E$ (3) $\frac{1}{4}E$ (4) $\frac{1}{2}E$

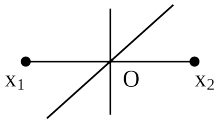
Scan or tap for the full solution

Q.51 A particle of mass m oscillates with simple harmonic motion between points x_1 and x_2, the equilibrium position being O. Its potential energy is plotted. It will be as given below in the graph [AIPMT 2003]

(1)


(2)


(3)


(4)


Scan or tap for the full solution

Q.52 The time period of mass suspended from a spring is T. If the spring is cut into four equal parts and the same mass is suspended from one of the parts, then the new time period will be [AIPMT 2003]
(1) T/4 (2) T (3) T/2 (4) 2T

Scan or tap for the full solution

Q.53 In case of a forced vibration, the resonance peak becomes very sharp when the [AIPMT 2003]

(1) damping force is small

(2) restoring force is small

(3) applied periodic force is small

(4) quality factor is small

Solution

Q.54 Displacement between maximum potential energy position and maximum kinetic energy position for a particle executing simple harmonic motion is [AIPMT 2002]

(1) $\pm a/2$ (2) $+a$ (3) $\pm a$ (4) -1

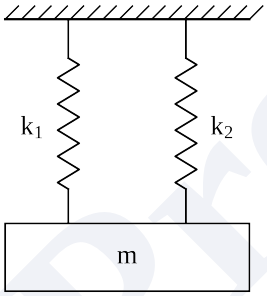
Scan or tap for the full solution

Q.55 When an oscillator completes 100 oscillations its amplitude is reduced to $\frac{1}{3}$ of initial value. What will be its amplitude, when it completes 200 oscillations? [AIPMT 2002]

(1) $\frac{1}{8}$ (2) $\frac{2}{3}$ (3) $\frac{1}{6}$ (4) $\frac{1}{9}$

Scan or tap for the full solution

Q.56 A mass is suspended separately by two different springs in successive order, then time periods are t_1 and t_2 respectively. If it is connected by both springs as shown in figure then time period is t_0, the correct relation is [AIPMT 2002]



(1) $t_0^2 = t_1^2 + t_2^2$ (2) $t_0^{-2} = t_1^{-2} + t_2^{-2}$

(3) $t_0^{-1} = t_1^{-1} + t_2^{-1}$ (4) $t_0 = t_1 + t_2$

Scan or tap for the full solution

Q.57 The total energy of particle performing SHM depends on [AIPMT 2001]

(1) k, a, m (2) k, a (3) k, a, x (4) k, x

Scan or tap for the full solution

Q.58 Two masses M_A and M_B are hung from two strings of length l_A and l_B respectively. They are executing SHM with frequency relation $f_A = 2f_B$, then relation [AIPMT 2000]

(1) $l_A = \frac{l_B}{4}$, does not depend on mass

(2) $l_A = 4l_B$, does not depend on mass

(3) $l_A = 2l_B$ and $M_A = 2M_B$

(4) $l_A = \frac{l_B}{2}$ and $M_A = \frac{M_B}{2}$

Solution

Q.59 The bob of simple pendulum having length l, is displaced from mean position to an angular position θ with respect to vertical. If it is released, then velocity of bob at equilibrium position [AIPMT 2000]

(1) $\sqrt{2gl(1-\cos\theta)}$ (2) $\sqrt{2gl(1+\cos\theta)}$

(3) $\sqrt{2gl\cos\theta}$ (4) $\sqrt{2gl}$

Scan or tap for the full solution

Q.60 The equations of two waves acting in perpendicular directions are given as $x = a\cos(\omega t+\delta)$ and $y = a\cos(\omega t+\alpha)$, where $\delta = \alpha + \frac{\pi}{2}$, the resultant wave represents [AIPMT 2000]

(1) a parabola (2) a circle

(3) an ellipse (4) a straight line

Scan or tap for the full solution

ANSWER KEY

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	4	4	2	1	3	4	2	2	2	3	4
Ques.	12	13	14	15	16	17	18	19	20	21	22
Ans.	3	1	3	1	2	3	1	4	3	4	1
Ques.	23	24	25	26	27	28	29	30	31	32	33
Ans.	2	2	2	4	2	4	1	3	3	3	2
Ques.	34	35	36	37	38	39	40	41	42	43	44
Ans.	3	1	4	3	3	4	2	2	4	1	3
Ques.	45	46	47	48	49	50	51	52	53	54	55
Ans.	3	1	4	4	4	3	1	3	1	3	4
Ques.	56	57	58	59	60						
Ans.	2	2	1	1	2						