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PHYSICS

BOOKS - DISHA PHYSICS (HINGLISH)

OSCILLATIONS

Physics

1. A simple harmonic motion is represented by $F(t) = 10\sin(20t + 0.5)$. The amplitude of the S.H.M. is

A. $a = 30cm$

B. $a = 20cm$

C. $a = 10cm$

D. $a = 5cm$

Answer:

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2. A particle executes a simple harmonic motion of time period T. Find the time taken

by the particle to go directly from its mean position to half the amplitude.

A. $T/2$

B. $T/4$

C. $T/8$

D. $T/12$

Answer:

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3. The periodic time of a body executing simple harmonic motion is 3 sec. After how much time from time $t = 0$, its displacement will be half of its amplitude

A. $\frac{1}{8}\text{sec}$

B. $\frac{1}{6}\text{sec}$

C. $\frac{1}{4}\text{sec}$

D. $\frac{1}{3}\text{sec}$

Answer:

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4. If $x = a\sin\left(\omega t + \frac{\pi}{6}\right)$ and $x = a\cos\omega t$, then what is the phase difference between the two waves?

A. $\pi/3$

B. $\pi/6$

C. $\pi/2$

D. π

Answer:

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5. A body is executing S.H.M. when its displacement from the mean position is 4 cm and 5 cm, the corresponding velocity of the body is 10 cm/sec and 8 cm/sec. Then the time period of the body is

A. 2π sec

B. $\pi/2$ sec

C. π sec

D. $3\pi/2$ sec`

Answer:

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6. If a simple pendulum oscillates with an amplitude of 50 mm and time period of 2 sec, then its maximum velocity is

A. $0.10m/s$

B. $0.15m/s$

C. $0.8m/s$

D. $0.26m/s$

Answer: B

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7. The maximum velocity and the maximum acceleration of a body moving in a simple harmonic oscillator are 2 m/s and $4m/s^2$. Then angular velocity will be

A. $3rad/\sec$

B. $0.5rad/\sec$

C. $1rad/\sec$

D. $2rad/\sec$

Answer:

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8. The amplitude of a executing SHM is $4cm$ At the mean position the speed of the particle is $16cm/s$ The distance of the particle from the mean position at which the speed the particle becomes $8\sqrt{3}cm/s$ will be

A. $2\sqrt{3}cm$

B. $\sqrt{3}cm$

C. 1cm

D. 2cm

Answer:

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9. The amplitude of a particle executing S.H.M. with frequency of 60 Hz is 0.01 m. The maximum value of the acceleration of the particle is

A. $144\pi^2 m/\sec^2$

B. $144\pi^2 m/\sec^2$

C. $\frac{144}{\pi^2} m/\sec^2$

D. $288\pi^2 m/\sec^2$

Answer: A

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10. A particle executes simple harmonic motion with an angular velocity and maximum

acceleration of $3.5rad/\sec$ and $7.5m/s^2$ respectively. The amplitude of oscillation

A. 0.28m

B. 0.36m

C. 0.53m

D. 0.61m

Answer:

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11. What is the maximum acceleration of the particle doing the SHM $\gamma = 2\sin\left[\frac{\pi t}{2}\phi\right]$ where gamma is in cm?

A. $\frac{\pi}{2} cm/s^2$

B. $\frac{\pi^2}{2} cm/s^2$

C. $\frac{\pi}{4} cm/s^2$

D. $\frac{\pi}{4} cm/s^2$

Answer:

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12. The total energy of a particle executing S.H.M. is proportional to

A. Displacement from equilibrium position

B. Frequency of oscillation

C. Velocity in equilibrium position

D. Square of amplitude of motion

Answer:

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13. When the displacement is half the amplitude, the ratio of potential energy to the total energy is

A. $\frac{1}{2}$

B. $\frac{1}{4}$

C. 1

D. $\frac{1}{8}$

Answer:

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14. A particle is executing simple harmonic motion with frequency f . The frequency at which its kinetic energy changes into potential energy is

A. $f/2$

B. f

C. $2f$

D. $4f$

Answer:

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15. A particle executes simple harmonic motion with a frequency. (f). The frequency with which its kinetic energy oscillates is.

A. $f/2$

B. f

C. $2f$

D. $4f$

Answer:

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16. The kinetic energy of a particle executing SHM is 16J. When it is in its mean position. If the amplitude of oscillation is 25cm and the mass of the particle is 5.12 kg, the time period of its oscillation in second is

A. $\frac{\pi}{5}\text{sec}$

B. $2\pi\ \text{sec}$

C. $20\pi\ \text{sec}$

D. $5\pi\ \text{sec}$

Answer:

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17. The displacement x(in metres) of a particle performing simple harmonic motion is related to time t(in seconds) as $x = 0.05\cos\left(4\pi t + \frac{\pi}{4}\right)$ .the frequency of the motion will be

A. $0.5Hz$

B. $1.0Hz$

C. $1.5Hz$

D. $2.0Hz$

Answer:

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18. A particle executes simple harmonic motion between $x = -A$ and $x = +A$. The time taken for it to go from $0 \to A/2 is T_1$ and $\to goomA/2 \to (A)is(T_2)$. Then.

A. $T_1 < T_2$

B. $T_1 > T_2$

C. $T_1 = T_2$

D. $T_1 < 2T_2$

Answer:

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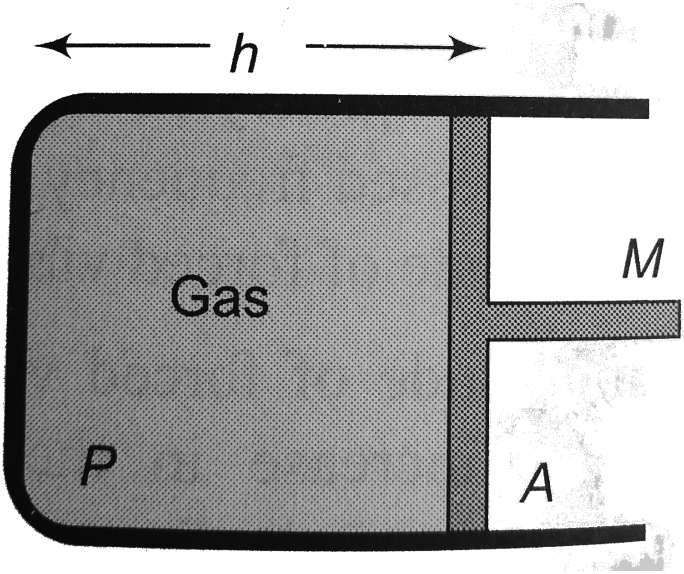
19. A cylinder piston of mass M sides smoothlly inside a long cylinder closed at and enclesing a cartin mass of gas The cylinder is

kept with its axis horizantal if the pistan is distanced from its equations positions it oscillation simple harmoniically .THe period of oscillation will be



A. $T = 2\pi S\sqrt{\left(\frac{Mh}{PA}\right)}$

B. $T = 2\pi\sqrt{\left(\frac{MA}{Ph}\right)}$

C. $T = 2\pi\sqrt{\left(\frac{M}{PAh}\right)}$

D. $T = 2\pi\sqrt{MPhA}$

Answer:

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20. A particle is performing simple harmonic motion along $x-$ axis with amplitude $4cm$ and time period $1.2\sec$ .The minimum time taken by the particle to move from

$x = 2cm \rightarrow x = +4cm$ and back again is given by

A. 0.6sec

B. 0.4sec

C. 0.3 sec

D. 0.2 sec

Answer:

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21. A spring of Force- constant K is cut into two pieces sach that one piece is double the length of the other . Then the long pieces will have a force - constant of

A. $(2/3)K$

B. $(3/2)K$

C. 3K

D. 6K

Answer:

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22. A simple pendulum has time period T_1. When the point of suspension moves vertically up according to the equation $y = kt^2$ where $k = 1m/s^2$ and $'t'$ is time then the time period of the pendulum is T_2 then $(T_1/T_2)^2$ is

A. $2/3$

B. $5/6$

C. $6/5$

D. $3/2$

Answer:

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23. A particle constrained to move along the x-axis in a

potential $V = k\mathrm{x}^2$ is subjected to an external time dependent

force $\vec{f}(t)$ here k is a constant, x the distance from the origin,

and t the time. At some time T, when the particle

has zero velocity at x = 0, the external force is removed.

Choose the incorrect options –

(1) Particle executes SHM

(2) Particle moves along +x direction

(3) Particle moves along – x direction

(4) Particle remains at rest

A. 1, 2 and 3 are correct

B. 1 and 2 are correct

C. 2 and 4 are correct

D. 1 and 3 are correct

Answer:

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24. Three simle harmionic motions in the same direction having the same amplitude (a) and same period are superposed. If each differs in phase from the next by 45°, then.

A. 1, 2 and 3 are correct

B. 1 and 2 are correct

C. 2 and 4 are correct

D. 1 and 3 are correct

Answer:

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25. For a particle executing simple harmonic motion, which

of the following statements is correct?

(1) The total energy of the particle always remains the same

(2) The restoring force is maximum at the

extreme positions

(3) The acceleration of the particle is maximum at the equilibrium position

(4) The acceleration of the particle is maximum at the equilibrium position

A. 1, 2 and 3 are correct

B. 1 and 2 are correct

C. 2 and 4 are correct

D. 1 and 3 are correct

Answer:

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26. The differential equation of a particle undergoing SHM is given by a $a\frac{d^2x}{dt^2} + bx = 0$. The particle starts from the extreme position.

The ratio of the maximum acceleration to the maximum velocity of the particle is –

A. $\frac{b}{a}$

B. $\frac{a}{b}$

C. $\sqrt{\frac{a}{b}}$

D. $\sqrt{\frac{b}{a}}$

Answer: D

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27. The differential equation of a particle undergoing SHM is given by a $a\frac{d^2x}{dt^2} + bx = 0$ltbr.gt The particle starts from the extreme position

The equation of motion may be given by :

A. $x = A\sin\left(\sqrt{\frac{b}{a}}\right)t$

B. $x = A\cos\left(\sqrt{\frac{b}{a}}\right)t$

C. $x = A\sin\left(\sqrt{\frac{b}{a}}t + 0\right)$ where 0

$\neq \pi/2$

D. None these

Answer:

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28. Statement-1 : In S.H.M., the motion is 'to and fro' and

periodic.

Statement-2 : Velocity of the particle

(v) $= \omega\sqrt{k^2 - x^2}$(where x is the displacement and k is amplitude)

A. Statement-1 is True, Statement-2 is True, Statement-2 is a

correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1.

C. Statement -1 is False, Statement-2 is True

D. Statement -1 is True, Statement-2 is False.

Answer:

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29. Assertion: In simple harmonic motion the velocity is maximum when the acceleration is minimum

Reason : Displacement and velocity of SHM differ in phase by $\frac{\pi}{2}$

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT

a correct explanation for Statement-1.

C. Statement -1 is False, Statement-2 is True. (d) Statement -1 is True, Statement-2 is False.

D. Statement -1 is True, Statement-2 is False.

Answer:

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30. STATEMENT-1 : The graph of total energy of a particle in $S.H.M$ w.r.t. position is a straight line with zero slope. STATEMENT-2 : Total graph of total energy of a particle in $S.H.M.$ remains constant throughout its motion.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1.

C. Statement -1 is False, Statement-2 is True.

D. Statement -1 is True, Statement-2 is False.

Answer:

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