SIMPLE HARMONIC MOTION — Topic - 2

1. Select the incorrect statement.
(a) A simple harmonic motion is necessarily periodic.
(b) A simple harmonic motion is necessarily oscillatory.
(c) An oscillatory motion is necessarily simple harmonic motion.
(d) Both a & b are correct.

2. A particle moves in a circular path with a uniform speed. Its motion is :
(a) periodic (b) oscillatory
(c) simple harmonic (d) all are correct.

3. Acceleration of particle in SHM is given by $a+16x=0,$ then time period of its motion will be :
(a) 16 sec (b) 4 sec (c) $\pi/2$ sec (d) π sec

4. Differential equation of a SHM is given by $\frac{d^2y}{dt^2}+100y=0,$ then time period of SHM will be :
(a) $\pi/2$sec (b) $\pi/5$sec (c) $\pi/10$sec (d) 10 sec

5. Force acting on a 1kg particle is given by $F=-2\sin 2x,$ then time period of SHM for small displacement will be :
(a) 2 sec (b) π sec (c) 4 sec (d) $\pi/2$ sec

6. Which of the following motion is not periodic motion ?
(a) $x=A\sin\omega t$ (b) $x=A\sin\omega t+A\sin\omega t$
(c) $x=e^t$ (d) None

7. Which of the following expression does not represent SHM?
(a) $y=A\cos\omega t$ (b) $y=A\sin 2\omega t$
(c) $y=A\sin\omega t+B\cos\omega t$ (d) $y=Ae^{\sin\omega t}$

8. Which of the following functions cannot represent SHM ?
(a) $y=\sin\omega t$ (b) $y=\sin\omega t+\cot 2\omega t$
(c) $y=\sin\omega t+2\cos\omega t$ (d) None of these

9. If a simple harmonic motion is given by, y = (sin ωt + cos ωt)m. Which of the following statements are true ?
(a) The amplitude is $\left(\sqrt{2}\right)$m.
(b) At t = 0, particle will be at $y=1$m.
(c) At t = 0, particle will be at $y=0$m.
(d) Both (a) & (b) are correct.

10. The equation $x=A\sin^2\left(\omega t+\frac{\pi}{6}\right)$ represents :
(a) S.H.M. with amplitude A
(b) periodic motion with amplitude A/2
(c) oscillatory motion with angular frequency ω
(d) uniformly accelerated motion

11. Two simple harmonic motions are represented by the following equations $y_1=40\sin\omega t$ and $y_2=10(\sin\omega t+C\cos\omega t)$. If their displacement amplitudes are equal, then the value of C (in appropriate units) is :
(a) $\sqrt{13}$ (b) $\sqrt{15}$ (c) $\sqrt{17}$ (d) 4

12. Equation for displacement of a particle performing SHM is given by $x=20\sin\pi t\cos\pi t$, then :
(a) amplitude of this SHM will be 10 unit
(b) time period of SHM will be T = 2 sec
(c) time period of SHM will be T = 1 sec
(d) both (a) & (c) are correct

13. The phase difference between two SHM $y_1=10\sin\left(10\pi t+\frac{\pi}{3}\right)$ and $y_2=12\sin\left(8\pi t+\frac{\pi}{4}\right)$ at t = 0.5s is :
(a) $\frac{11\pi}{12}$ (b) $\frac{13\pi}{12}$ (c) π (d) $\frac{17\pi}{12}$

14. Two SHM are given by $y_1=a\sin[(\pi/2)t+\phi]$ and $y_2=b\sin[(2\pi/3)+\phi]$. The phase difference between these after 1 sec is :
(a) π (b) $\pi/2$ (c) $\pi/4$ (d) $\pi/6$

15. Amplitude & time period of a SHM are 10 cm & 2 sec respectively, if initially particle is at 5 cm, then equation for displacement of its SHM motion will be :
(a) $x=10\sin\pi t$ (b) $x=10\sin\left(\pi t+\frac{\pi}{6}\right)$

(c) $x = 10\sin\left(\pi t + \frac{5\pi}{6}\right)$

(d) both (b) and (c) are correct.

16. Force acting on 2 kg particle in SHM is given by $F = 200\sin(50t)$ then amplitude of SHM will be :
(a) 10 cm (b) 4 cm (c) 2 cm (d) none

17. Potential energy of a 2kg particle is given by $U = 4x^2$J then time period of its motion about its mean position will be :
(a) 4 πsec (b) $\pi/2$sec (c) π sec (d) 2π sec

18. Potential energy of a 1kg particle is given by $U = -\cos 2x$ then time period of motion of particle for small displacement about its mean position will be:
(a) $\frac{\pi}{2}$sec (b) π sec (c) $\frac{\pi}{4}$sec (d) 2π sec

19. The potential energy of a particle of mass 1 kg in motion along the x-axis is given by $U = 4(1-\cos 2x)$J (x is in meter). The period of small oscillation (in second) is :
(a) 2π (b) π (c) $\pi/2$ (d) $\sqrt{2}\pi$

20. A particle moves such that its acceleration is given by $a = -\beta(x-2)$. Here, β is a positive constant and x the position from origin. Time period of oscillations is :
(a) $2\pi\sqrt{\beta}$ (b) $2\pi\sqrt{\frac{1}{\beta}}$ (c) $2\pi\sqrt{\beta+2}$ (d) $2\pi\sqrt{\frac{1}{\beta+2}}$

21. SHM of a particle is given by $x = 10(\text{cm})\sin\left(\frac{\pi}{2}t + \frac{2\pi}{3}\right)$ then :
(a) amplitude of SHM is 10 cm
(b) initially particle is at $x = 5\sqrt{2}$ cm & moving away from mean position
(c) initially particle is at $x = 5\sqrt{3}$ cm & moving toward mean position
(d) both (a) & (c) are correct

22. The time period and amplitude of a simple pendulum are 4 second and 0.2 metre respectively. If the displacement is 0.1 m at time t = 0, the equation of its displacement is represented by :
(a) $y = 0.2\sin(0.5\pi t)$
(b) $y = 0.2\sin(0.5\pi t + \pi/6)$
(c) $y = 0.1\sin(\pi t + \pi/6)$
(d) $y = 0.1\sin(0.5\pi t)$

23. A particle perform SHM according to equation $x = A\sin\left(\frac{\pi}{6} - \omega t\right)$, where x is in metre and time is in second. Find time instant at which it stop first time.
(a) $\frac{2\pi}{3\omega}$ (b) $\frac{\pi}{\omega}$ (c) $\frac{\pi}{6\omega}$ (d) None

24. Displacement equation for SHM of a particle is given by $x = 10$ (cm) $\sin\left(\frac{\pi}{2}t + \frac{\pi}{6}\right)$ then time taken by the particle to reach at extreme position $x = 10$ cm first time will be :
(a) 1 sec (b) $\frac{1}{3}$sec (c) $\frac{2}{3}$sec (d) none

25. Displacement equation for SHM of a particle is given by $x = 20$ (cm) $\sin\left(\frac{\pi}{2}t + \frac{\pi}{4}\right)$ then time taken by the particle to come at mean position first time will be :
(a) 1 sec (b) $\frac{3}{2}$sec (c) $\frac{5}{3}$sec (d) 2 sec

26. If time period of SHM is T, then minimum time taken by the particle to move from $x = 0$ to $A/\sqrt{2}$ will be :
(a) T/6 (b) T/8 (c) T/3 (d) T/12

27. Time period of SHM of a particle is T, then ratio of time taken by the particle to move from O to A/2 & A/2 to A will be :
(a) 1:2 (b) 1:1 (c) 2:1 (d) 1:3

28. Which of the following option is correct about SHM ?
(a) In SHM time taken to move from A/2 to A will be equal to A to A/2.
(b) Time taken to move from -A to -A/2 will be equal to O to A/2

(c) Time taken to move $-\frac{\sqrt{3}A}{2}$ to O is equal to time taken to move from O to $\sqrt{3}\frac{A}{2}$.

(d) Both (a) and (c)

29. The phase difference in radians between displacement and velocity in S.H.M. is :

(a) $\pi/4$ (b) $\pi/2$ (c) π (d) 2π

30. A particle executing simple harmonic motion has a time period of 4s. After how much interval of time from t = 0 will its displacement be half of its amplitude from mean position :

(a) 1/3 s (b) 1 / 2 s (c) 2 / 3 s (d) 1 / 6 s

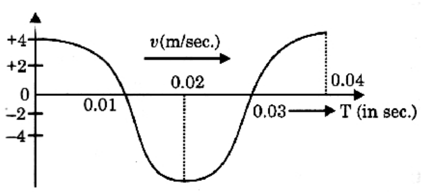
31. If time period of a SHM is 4 sec, then find out time taken to reach particle from $x = A/2$ to $x = \frac{A}{\sqrt{2}}$.

(a) 1/3 sec (b) 1/6 sec (c) 1/2 sec (d) 1/4 sec

32. A particle executes SHM of amplitude 25 cm and time period 3s. What is the minimum time required for the particle to move between two points 12.5 cm on either side of the mean position ?

(a) 0.5s (b) 1.0s (c) 1.5s (d) 2.0s

33. The velocity-time diagram of a harmonic oscillator is shown in the adjoining figure. The frequency of oscillation is :



(a) 25 Hz
(b) 50 Hz
(c) 12.25Hz
(d) 33.3 Hz

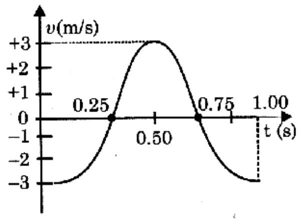
34. The amplitude of a particle executing SHM is 4 cm. At the mean position, the speed of the particle is 16 cm/s. The distance of the particle from the mean position at which the speed of the particle becomes $8\sqrt{3}$ cm/s will be :

(a) $2\sqrt{3}$ cm (b) 2 cm (c) 4 cm (d) 6 cm

35. A particle is executing SHM on a 20 cm line its time period of oscillation is T = 2 sec, then its maximum velocity will be :

(a) $\frac{\pi}{5}$ m/sec (b) $\frac{\pi}{10}$ m/sec
(c) 5π m/sec (d) 10π m/sec

36. Velocity-time graph of a particle performing SHM is as shown in figure. Amplitude of oscillation is then nearly :
its time period is π. At a displacement of 3 cm from its mean position the velocity in cm/sec will be :



(a) 20 cm
(b) 48 cm
(c) 75 cm
(d) 8 cm

37. If the maximum velocity of a particle in SHM is υ_o then its velocity at half the amplitude from position of rest will be :

(a) $\upsilon_o/2$ (b) υ_o (c) $\upsilon_o\sqrt{3/2}$ (a) $\upsilon_o\sqrt{3}/2$

38. At a particular position the velocity of a particle in SHM with amplitude a is $\sqrt{3}/2$ that at its mean position. In this position, its displacement is :

(a) a/2 (b) $\sqrt{3}a/2$ (c) $a\sqrt{2}$ (d) $\sqrt{2a}$

39. The amplitude of a particle in SHM is 5 cm and

(a) 8 (b) 12 (c) 2 (d) 16

40. The time period of an oscillating body executing SHM is 0.05 sec and its amplitude is 40 cm. The maximum velocity of particle is :

(a) 16π ms^{-1} (b) 2π ms^{-1} (c) 3.1 ms^{-1} (d) 4π ms^{-1}

41. The maximum velocity of a particle in SHM is υ. If the amplitude is doubled and the time period of oscillation decreased to 1 / 3 of its original value, the maximum velocity becomes :

(a) 18υ (b) 12υ (c) 6υ (d) 3υ

42. The displacement of a particle executing SHM is given by y = 0.25 sin 200t cm. The maximum speed of the particle is :

(a) 200 cm s^{-1} (b) 100cm s^{-1}
(c) 50 cm s^{-1} (d) 5.25 cm s^{-1}

43. The maximum velocity of a simple harmonic motion represented by $y = 3\sin\left(100t + \frac{\pi}{6}\right)$ m is

given by :

(a) $300 ms^{-1}$ (b) $\frac{3\pi}{6} ms^{-1}$ (c) $100\ ms^{-1}$ (d) $\frac{\pi}{6} ms^{-1}$

44. A particle executes simple harmonic motion according to the displacement equation $y = 10\cos\left(2\pi t + \frac{\pi}{6}\right)$ cm; where t is in second. The velocity of the particle at $t = 1/6$ seconds will be :

(a) $-6.28\ ms^{-1}$ (b) $-0.628\ ms^{-1}$
(c) $0.628\ ms^{-1}$ (d) $6.28\ ms^{-1}$

45. If maximum velocity of a particle in S.H.M. is given by υ_m, what is maximum average velocity of the particle in half time period ?

(a) $\frac{\pi}{2}\upsilon_m$ (b) $\frac{2}{\pi}\upsilon_m$ (c) $\frac{\pi}{4}\upsilon_m$ (d) $\frac{\upsilon_m}{\sqrt{2}}$

46. When a particle executes SHM there is always a constant ratio between its displacement and :

(a) velocity (b) acceleration
(c) mass (d) time period

47. Which of the following options are incorrect for SHM ?

(a) Phase difference between υ and x is $\pi/2$ in SHM.
(b) Phase difference between υ and x in SHM is 0.
(c) Phase difference between a and υ is $\pi/2$.
(d) None

48. The average acceleration of a particle performing SHM over one complete oscillation is :

(a) $\frac{\omega^2 A}{2}$ (b) $\frac{\omega^2 A}{\sqrt{2}}$ (c) zero (d) $A\omega^2$

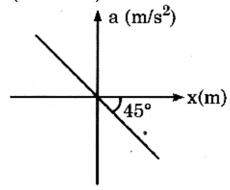
49. Which of the following quantities is always negative in SHM ?

(a) $\vec{F}.\vec{a}$ (b) $\vec{\upsilon}.\vec{s}$ (c) $\vec{a}.\vec{s}$ (d) $\vec{F}.\vec{\upsilon}$

50. For a particle in S.H.M., if the amplitude of displacement is 'a' and the amplitude of velocity is 'υ' the amplitude of acceleration is :

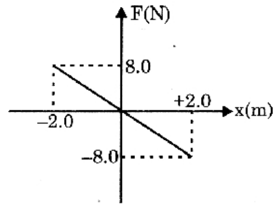
(a) $\frac{3}{4}$sec (b) $\frac{1}{2}$sec (c) 1sec (d) 2sec

51. Acceleration-displacement graph of a particle executing SHM is as shown in given figure. The time period of its oscillation is : (in sec)



(a) $\pi/2$
(b) 2π
(c) π
(d) $\pi/4$

52. A body of mass 0.01 kg executes simple harmonic motion (S.H.M) about $x = 0$ under the influence of a force shown below. The period of the S.H.M. is :

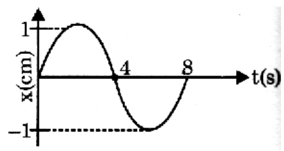


(a) 1.05s
(b) 0.52s
(c) 0.25s
(d) 0.30s

53. A simple harmonic oscillation has got a displacement 0.02 m and acceleration $2.0\ m/s^2$ at any time.The angular frequency of the motion is :

(a) $10\ rad\ s^{-1}$ (b) $0.1\ rad\ s^{-1}$
(c) $100\ rad\ s^{-1}$ (d) $1\ rad\ s^{-1}$

54. The x-t graph of a particle undergoing simple harmonic motion is shown in the figure.The acceleration of the particle at $t = \frac{4}{3}$ sec. is :



(a) $\frac{\sqrt{3}}{32}\pi^2 cm/s^2$ (b) $\frac{\pi^2}{32}\pi^2 cm/s^2$
(c) $\frac{-\pi^2}{32} cm/s^2$ (d) $\frac{-\sqrt{3}\pi^2}{32} cm/s^2$

55. For a particle executing simple harmonic motion, determine the ratio of average acceleration of particle from extreme position to equilibrium position to the maximum acceleration.

(a) $\frac{4}{\pi}$ (b) $\frac{2}{\pi}$ (c) $\frac{1}{\pi}$ (d) $\frac{1}{2\pi}$

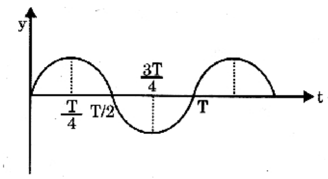
56. A particle executes SHM on a straight line path. The amplitude of oscillation is 2 cm. When the displacement of the particle from the mean position is 1 cm, the numerical value of magnitude of acceleration is equal to the numerical value of magnitude of velocity. Then find out the frequency of SHM.

(a) $\sqrt{3}/2\pi$ (b) $3/2\pi$ (c) $3/\sqrt{2}\pi$ (d) $\sqrt{3}/x$

57. The maximum velocity and acceleration of a particle in S.H.M. are 100 cm/sec and 157 cm/sec^2 respectively. The time period in seconds will be :
(a) 4 (b) 1.57 (c) 0.25 (d) 1

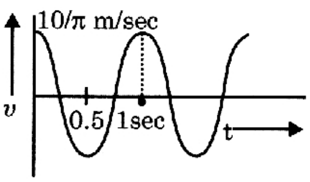
58. The phase difference between the displacement and acceleration of particle executing S.H.M. in radian is :
(a) $\pi/4$ (b) $\pi/2$ (c) π (d) 2π

59. The graph shows the variation of displacement of a particle executing S.H.M. with time. The inference from this graph that :

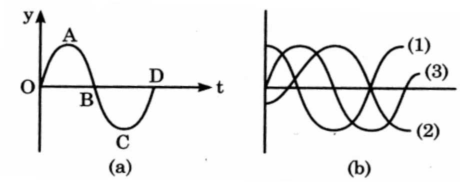


(a) the force is zero at time 3T/4
(b) the velocity is maximum at time T/2
(c) the acceleration is maximum at time T
(d) the PE is equal to half of total energy at time T/2

60. υ vs t curve is shown in diagram, then amplitude of SHM will be :
(a) 10 cm
(b) 25 cm
(c) 50 cm
(d) 100 cm

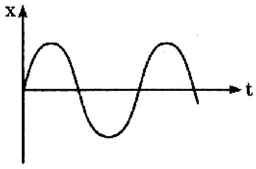


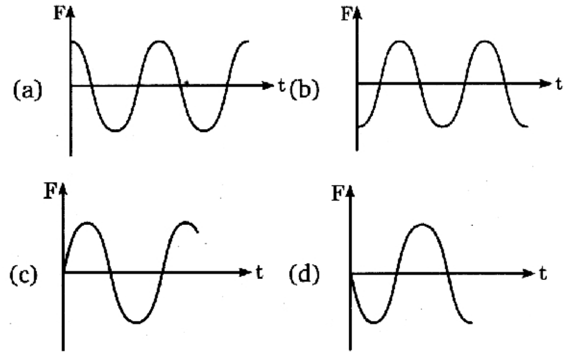
61. The displacement-time graph of a simple harmonic motion is given in the figure (1) below.



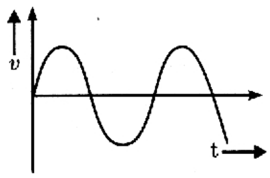
(a) The motion of the oscillator is described by equation $y = a\sin\left(\omega t - \frac{\pi}{2}\right)$.
(b) The velocity-time graph for the above oscillator will be curve (1) of figure (b).
(c) Curve (1) will be the acceleration-time graph.
(d) Curve (3) describes the variation of force acting on the particle.

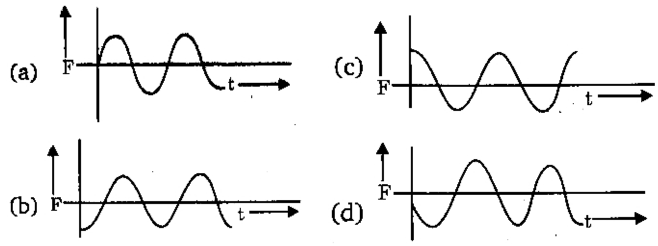
62. Displacement-time graph of a particle executing SHM is as shown. The corresponding force-time graph of the particle can be :





63. υvst graph for SHM is shown, then F vst graph will be :





64. The total energy of a vibrating particle in SHM is E. If its amplitude and time period are doubled, its total energy will be :
(a) 16E (b) 8E (c) 4E (d) E

65. The total vibrational energy of a particle in S.H.M. is E. Its kinetic energy at half the amplitude from mean position will be :
(a) E/2 (b) E/3 (c) E (d) 3E/4

66. If total energy of a particle in SHM is E, then the potential energy of the particle at half the amplitude will be :
(a) E/2 (b) E/4 (c) 3E/4 (d) E/8

67. A particle is describing SHM with amplitude 'a'. When the potential energy of particle is one fourth of the maximum energy during oscillation, then its displacement from mean position will be:
(a) $\frac{a}{4}$ (b) $\frac{a}{3}$ (c) $\frac{a}{2}$ (d) $\frac{2a}{3}$

68. A particle executes SHM on a line 8 cm long. Its KE and PE will be equal when its distance from the mean position is :
(a) 4 cm (b) 2 cm (c) $2\sqrt{2}$ cm (d) $\sqrt{2}$ cm

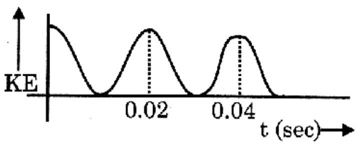
69. A particle of mass 0.10 kg executes SHM with an amplitude 0.05 m and frequency 20 vib/s. Its energy of oscillation is:
(a) 2 J (b) 4 J (c) 1 J (d) zero

70. The ratio of frequencies of two pendulums are 2 : 3, then the ratio of their lengths will be :
(a) $\sqrt{\frac{2}{3}}$ (b) $\sqrt{\frac{3}{2}}$ (c) $\frac{4}{9}$ (d) $\frac{9}{4}$

71. The displacement of two identical particles executing SHM are represented by equations $x_1 = 4\sin\left[10t + \left(\frac{\pi}{6}\right)\right]$ and $x_2 = 5\cot\omega t$. For what value of ω energy of both the particles is same ?
(a) 16 units (b) 6 units (c) 4 units (d) 8 units

72. A particle is executing SHM. At a point $x = 2A/3$, kinetic energy of the particle is K, where A is the amplitude. At a point $x = 2A/3$, kinetic energy of the particle will be :
(a) 2K (b) $K\sqrt{2}$ (c) $\frac{5}{8}K$ (d) $\frac{5}{3}K$

73. KE vs t curve for SHM is shown in graph, then frequency of SHM will be:

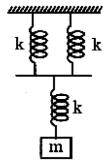


(a) 50Hz (b) 100Hz (c) 25Hz (d) None

74. A particle executes SHM with a frequency f. The frequency of its PE will be :
(a) f/2 (b) f (c) 2f (d) 4f

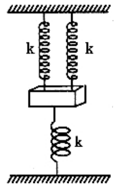
75. The potential energy of a particle executing SHM changes from maximum to minimum is 5s. Then the time period of SHM is :
(a) 5 s (b) 10 s (c) 15 s (d) 20 s

76. A block of mass m hangs from three light springs having same spring constant k. If the mass is slightly displaced vertically, time period of oscillation will be :



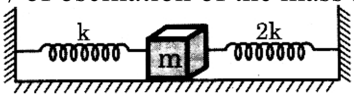
(a) $2\pi\sqrt{\frac{m}{3k}}$ (b) $2\pi\sqrt{\frac{3m}{2k}}$
(c) $2\pi\sqrt{\frac{2m}{3k}}$ (d) $2\pi\sqrt{\frac{3k}{m}}$

77. In the figure all spring are ideal and identical having spring constant k. The block has mass m. The frequency of oscillation of the block is :



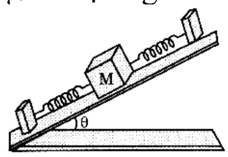
(a) $\frac{1}{2\pi}\sqrt{\frac{3k}{m}}$ (b) $\frac{1}{2\pi}\sqrt{\frac{3k}{2m}}$ (c) $\frac{1}{2\pi}\sqrt{\frac{m}{3k}}$
(d) none of these

78. Two springs of force constants k and 2k are connected to a mass as shown below. The frequency of oscillation of the mass is:



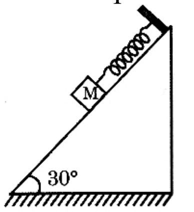
(a) $(1/2\pi)\sqrt{k/m}$ (b) $(1/2\pi)\sqrt{2k/m}$
(c) $(1/2\pi)\sqrt{3k/m}$ (d) $(1/2\pi)\sqrt{m/k}$

79. On a smooth inclined plane, a body of mass M is attached between two springs. The other ends of the springs are fixed to firm supports. If each spring has force constant K, the period of oscillation of the body (assuming the springs as massless) is :



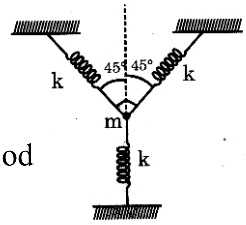
(a) $2\pi\left(\frac{M}{2k}\right)^{1/2}$ (b) $2\pi\left(\frac{2M}{k}\right)^{1/2}$
(c) $2\pi\frac{Mg\sin\theta}{2k}$ (d) $2\pi\left(\frac{2Mg}{k}\right)^{1/2}$

80. A block of mass 0.2 kg, which slides without friction on a 30° incline, is connected to the top incline by a massless spring of force constant 80 Nm^{-1} as shown in figure. If the block is pulled slightly from its mean position,what is the period of oscillations ?



(a) πs (b) $\frac{\pi}{10}$s
(c) $\frac{2\pi}{5}$s (d) $\frac{\pi}{2}$s

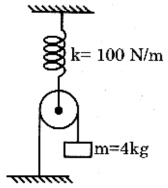
81. A light particle of mass m is in equilibrium as shown, now mass m is displaced vertically downward by x, then time period of its SHM will be :



(a) $T = 2\pi\sqrt{\frac{m}{k}}$ (b) $T = 2\pi\sqrt{\frac{m}{4k}}$

(c) $T = 2\pi\sqrt{\frac{2m}{k}}$ (d) $T = 2\pi\sqrt{\frac{m}{2k}}$

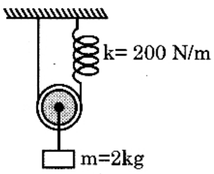
82. Angular frequency of the following arrangements will be :



(a) 5 rad/sec (b) 20 rad/sec

(c) $\frac{5}{2}$ rad/sec (d) none

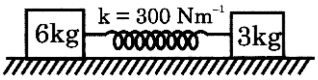
83. Angular frequency of the following arrangements will be :



(a) 5 rad/sec (b) 20 rad/sec

(c) $\frac{5}{2}$ rad/sec (d) none

84. Two point masses of 3 kg and 6 kg are attached to opposite ends of horizontal spring whose spring constant is 300 Nm^{-1} as shown in the figure. The natural vibration frequency of the system is approximately:



(a) 4 Hz (b) 3 Hz

(c) 2 Hz (d) 1 Hz

85. If the length of a pendulum is made 9 times and mass of the bob is made 4 times, then the value of time period becomes :

(a) 3 T (b) 3/2T (c) 4T (d) 2 T

86. If length of a simple pendulum is increased by 4% then percentage change in time period will be:

(a) 4% (b) 6% (c) 2% (d) 8%

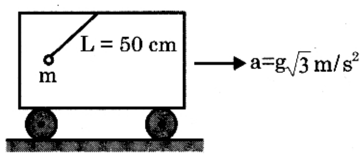
87. The time period of a simple pendulum is 2 sec. If its length is increased by 4 times, then its period becomes:

(a) 16 s (b) 12 s (c) 8 s (d) 4 s

88. If the length of the second pendulum is increased by 21%. How many oscillations it will lose per day ?

(a) 3927 (b) 3722 (c) 34273 (d) 3272

89. A simple pendulum 50 cm long is suspended from the roof of a cart accelerating in the horizontal direction with constant acceleration $\sqrt{3}$ g m/s^2. The period of small oscillations of the pendulum about it's equilibrium position is ($g = \pi^2 m/s^2$):



(a) 1.0 sec (b) 1.25 sec (c) 1.53 sec (d) 1.68 sec

90. A simple pendulum is suspended from the ceiling of a lift. When the lift is at rest, its time period is T. With what acceleration should lift be accelerated upwards in order to reduce its time period to $\frac{T}{2}$.

(a) 1g (b) 3g (c) 5g (d) 2g

91. A pendulum is made to hang from the ceiling of an elevator. It has period of Ts (for small angles). The elevator is made to accelerate upwards with $10 m/s^2$. The period of the pendulum now will be: (take, $g = 10 m/s^2$)

(a) $T\sqrt{2}$ (b) infinite (c) $T/\sqrt{2}$ (d) zero

92. A thin uniform rod of length l is pivoted at its upper end. It is free to swing in a vertical plane. Its time period for oscillations of small amplitude is :

(a) $2\pi\sqrt{\frac{l}{g}}$ (b) $2\pi\sqrt{\frac{2l}{3g}}$ (c) $2\pi\sqrt{\frac{3l}{2g}}$ (d) $2\pi\sqrt{\frac{l}{3g}}$

93. If a rod of length L is hung by its end on a nail and allowed to oscillate, find the equivalent length of simple pendulum for same time period.

(a) L/3 (b) 2L (c)2L/3 (d) L/6

94. In a damped oscillation if value damped constant is b = 0.02 kg/sec and mass of object connected with oscillator is 1 kg, then time taken by oscillator to reduce its amplitude by half of its initial value :

(a) 69.3 sec (b) 6.93 sec (c) 693 sec (d) none

95. If displacement equation of damped oscillation is given by $x = 8e^{-0.05t} \sin(\omega t + \phi)$ then time after which its amplitude will be A = 2 unit?

(a) $\simeq$ 7sec (b) $\simeq$ 28sec (c) $\simeq$ 14sec (d) $\simeq$ 21sec

96. If displacement equation of damped oscillation is given by $x = 100e^{-\frac{b}{4}t} \sin(\omega t + \phi)$. Amplitude of this oscillator is reduced to A = 25 in 7 sec then, value of damping constant (b) will be:

(a) 0.2 kg/sec (b) 0.1 kg/sec

(c) 0.8 kg/sec (d) 0.4 kg/sec

97. A damped harmonic oscillator has amplitude 16 cm at t = 2 sec, then the amplitude of same

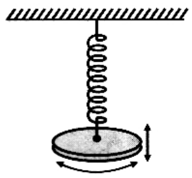
oscillator at t = 8 sec, will be: (Initial amplitude = 32 cm)

(a) 1.0 cm (b) 2.0 cm (c) 3.0 cm (d) 4.0 cm

98. Damping constant for damped oscillation b = 0.4 kg/sec if mass of object connected with oscillation is 2 kg, then time in which energy of oscillator will be one fourth of its initial value :

(a) 3.5 sec (b) 7 sec (c) 14 sec (d) 21 sec

99. A disc is made to oscillate about a horizontal axis passing through midpoint of its radius. Determine its time period.

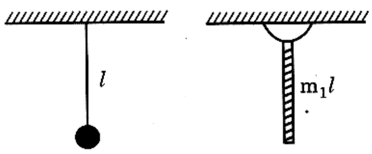


(a) $2\pi\sqrt{\frac{R}{g}}$ (b) $2\pi\sqrt{\frac{2R}{g}}$

(c) $2\pi\sqrt{\frac{3R}{g}}$ (d) $2\pi\sqrt{\frac{3R}{2g}}$

100. A simple pendulum and a homogeneous rod pivoted at its end are free to oscillate with small amplitude. What is the ratio of their periods of swing if their lengths are identical ?

(a) 1 : 1 (b) $\sqrt{3}$: 2 (c) $\sqrt{3}$: $\sqrt{2}$ (d) $\sqrt{2}$: 1



ANSWERS

SIMPLE HARMONIC MOTION

1. (c)	2. (a)	3. (c)	4. (b)	5. (b)
6. (c)	7. (d)	8. (b)	9. (d)	10. (b)
11. (b)	12. (d)	13. (b)	14. (d)	15. (d)
16. (b)	17. (c)	18. (b)	19. (c)	20. (b)
21. (d)	22. (b)	23. (a)	24. (c)	25. (b)
26. (b)	27. (a)	28. (d)	29. (b)	30. (a)
31. (b)	32. (a)	33. (a)	34. (b)	35. (b)
36. (b)	37. (d)	38. (a)	39. (a)	40. (a)
41. (c)	42. (c)	43. (a)	44. (c)	45. (b)
46. (b)	47. (b)	48. (c)	49. (c)	50. (b)
51. (b)	52. (d)	53. (a)	54. (d)	55. (b)
56. (a)	57. (a)	58. (c)	59. (b)	60. (c)
61. (b)	62. (d)	63. (c)	64. (d)	65. (d)
66. (b)	67. (c)	68. (c)	69. (a)	70. (d)
71. (d)	72. (c)	73. (c)	74. (c)	75. (d)
76. (b)	77. (a)	78. (c)	79. (a)	80. (b)
81. (d)	82. (c)	83. (b)	84. (c)	85. (a)
86. (c)	87. (d)	88. (a)	89. (a)	90. (b)
91. (c)	92. (b)	93. (c)	94. (b)	95. (b)
96. (c)	97. (b)	98. (b)	99. (d)	100. (c)