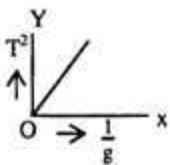
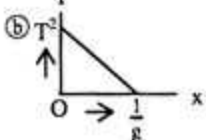
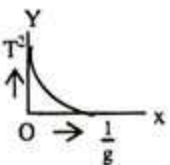
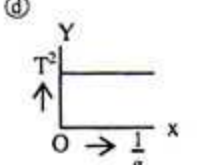
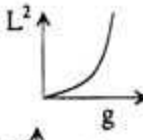
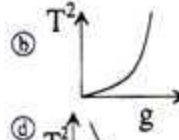
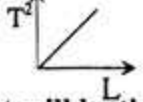
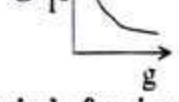


Chapter-8: Periodic Motion

1. How does the time period of a simple pendulum change if temperature increases?
 (a) Decreases (b) Increases
 (c) Stays same (d) Negligible change **(b)**
2. The motion that repeats after a certain period of time, what is it called?
 (a) Linear motion (b) Circular motion
 (c) Angular motion (d) Periodic motion **(d)**
3. What is the frequency of the minute hand of a wristwatch? [D.B.-16]
 (a) 2.78 Hz (b) 2.78×10^{-1} Hz
 (c) 2.78×10^{-2} Hz (d) 2.78×10^{-4} Hz **(d)**
4. If the motion of a particle in simple harmonic oscillation starts from the maximum position of displacement, what is the initial phase? [R.B.-16]
 (a) 0 (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{2}$ (d) π **(c)**
5. The value of acceleration of an object in simple harmonic oscillation is of the value of displacement—
 (a) Proportional (b) Equal
 (c) Inverse proportional (d) Less than **(d)**
6. A simple pendulum ticks once every 0.75 sec on the Earth surface. What is the effective length of the pendulum? [Dj.B.-16]
 (a) 0.186 m (b) 0.326 m
 (c) 0.559 m (d) 0.686 m **(c)**
7. Angular displacement of simple pendulum won't be more than which of the following? [Dj.B.-16]
 (a) 3° (b) 4° (c) 5° (d) 6° **(b)**
8. What is the angular frequency if the phase difference is 2π during time T of a complete oscillation? [J.B.-16]
 (a) $\omega = 2\pi / f$ (b) $\omega = \frac{T}{2\pi}$
 (c) $\omega = 2\pi f$ (d) $\omega = 2\pi T$ **(c)**
9. Which of the following is equivalent to zero phase? [J.B.-16]
 (a) $\frac{\pi}{2}$ (b) π (c) $\frac{3\pi}{2}$ (d) 2π **(d)**
10. What is the distance between two consecutive nodes in a standing wave? [J.B.-16]
 (a) λ (b) $\frac{\lambda}{2}$ (c) $\frac{\lambda}{4}$ (d) $\frac{\lambda}{8}$ **(b)**
11. What is the maximum displacement of a particle in simple pendulum motion? [J.B.-16]
 (a) $x_{\max} = A$ (b) $x_{\max} = \omega^2 A$
 (c) $x_{\max} = \omega A$ (d) $x_{\max} = \omega^2 x$ **(a)**
12. How many units is the angular frequency in $5\frac{d^2x}{dt^2} + 180x = 0$ equation? [Ctg B.-16]
 (a) 180 (b) 36 (c) 6 (d) 5 **(c)**
13. Which of the following graph is correct? [R.B.-15]
 (a)  **(a)**
 (b)  **(b)**
 (c)  **(c)**
 (d)  **(d)**
14. Which of the following graph represents the third law of simple pendulum? [R.B.-17]
 (a)  **(a)**
 (b)  **(b)**
 (c)  **(c)**
 (d)  **(d)**
15. What will be the time period of a simple pendulum if the mass of the bob is increased? [R.B.-15]
 (a) Increase (b) Decrease
 (c) Will not change (d) Proportional to the square root of the mass **(c)**
16. What will be the time period of a simple pendulum if it is taken to the center of the Earth?
 (a) Zero (b) Less than on the Earth surface
 (c) Equal to the Earth surface (d) Infinite **(d)**
17. What will be the maximum velocity of a particle in simple pendulum motion? [R.B.-15]
 (a) $v_{\max} = \frac{\omega}{A}$ (b) $v_{\max} = \frac{A}{\omega}$
 (c) $v_{\max} = \omega A$ (d) $v_{\max} = \omega^2 A$ **(c)**
18. The motion of a particle in simple harmonic oscillation motion is in mid position —
 (a) Minimum velocity, maximum acceleration
 (b) Minimum velocity, minimum acceleration
 (c) Maximum velocity, maximum acceleration
 (d) Maximum velocity, minimum acceleration **(d)**
19. What will be the maximum value of kinetic energy if the amplitude and force constant of a particle in simple harmonic oscillation motion is A and k ?
 (a) 0 (b) $kA^2/2$ (c) kA^2 (d) $k^2A/2$ **(b)**
20. The length, mass and frequency of a simple pendulum is L , M and f . What should be done to make $2f$ frequency? [R.B.-15]
 (a) Length should be increased to $4L$
 (b) Length should be increased to $2L$
 (c) Length should be decreased to $\frac{L}{2}$
 (d) Length should be decreased to $\frac{L}{4}$ **(d)**
21. If the differential equation of a particle in simple harmonic oscillation measure in S.I units is $2\frac{d^2x}{dt^2} + 32x = 0$, then what will be the angular frequency? [D. B.-15]
 (a) $4 \text{ rad}\cdot\text{s}^{-1}$ (b) $8 \text{ rad}\cdot\text{s}^{-1}$
 (c) $16 \text{ rad}\cdot\text{s}^{-1}$ (d) $32 \text{ rad}\cdot\text{s}^{-1}$ **(a)**
22. What is the maximum displacement from the equilibrium of a simple harmonic particle denoted by?
 (a) $\frac{1}{2}\lambda$ (b) λ (c) $\frac{1}{2}A$ (d) A **(d)**
23. Which can be determined by a simple pendulum? [Dj.B.-15]
 (a) Free velocity (b) Height of hill
 (c) Gravitational constant (d) Velocity of Earth rotation **(b)**

24. If the ratio of the time periods of two simple pendulum in a place is 2 : 3 then what is the ratio of their effective lengths? [Dj.B.-15]
 (a) 2 : 3 (b) 3 : 2 (c) 4 : 9 (d) 9 : 4 (c)

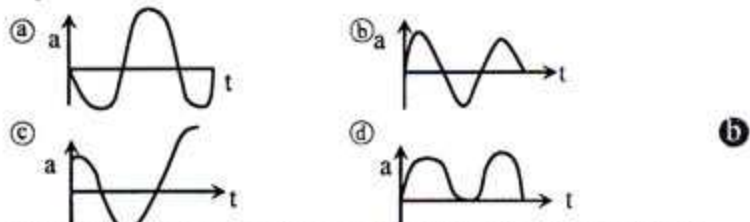
25. What is the frequency of a second pendulum? [Ctg.B.-15]
 (a) 0.5 Hz (b) 1 Hz (c) 2 Hz (d) 4 Hz (a)

26. If the time period of a simple pendulum is 10 s then which of the following is the relation between acceleration a and displacement x ? [Ctg.B.-15]
 (a) $a = \left(\frac{\pi}{5}\right)^2 x$ (b) $a = \left(\frac{\pi}{5}\right)x$
 (c) $a = -\left(\frac{\pi}{5}\right)^2 x$ (d) $a = -\left(\frac{\pi}{5}\right)x$ (c)

27. The amplitude and frequency of an object in simple harmonic motion is 0.01m and frequency 12Hz. What is its velocity at 0.005m displacement? [R.B.-17]
 (a) 0.03 ms^{-1} (b) 0.3968 ms^{-1}
 (c) 0.5328 ms^{-1} (d) 0.65264 ms^{-1} (d)

28. Which is the acceleration equation in case of simple harmonic oscillation motion? [B.B.-15]
 (a) $a = A \sin \omega t$ (b) $a = A \omega \cos \omega t$
 (c) $a = -A \omega^2 \sin \omega t$ (d) $a = -A \omega^2 \cos \omega t$ (c)

29. If the displacement of a particle is $Y = A \sin \omega t$, then which is the acceleration vs. time graph? [C.B.-17]



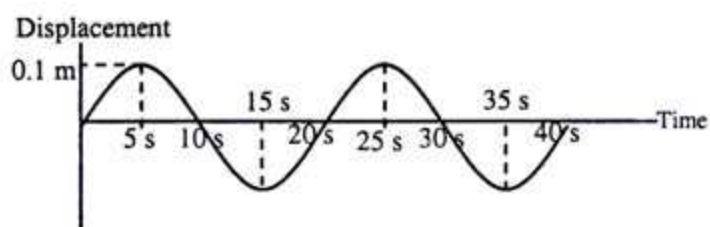
30. What will happen if the object frequency is equal to the frequency of forced periodic oscillation? [B.B.-15]
 (a) Beat (b) Interference
 (c) Standing wave (d) Resonance (d)

31. Which is the acceleration of a particle in simple harmonic motion? [J.B.-15]
 (a) $a = \omega x^2$ (b) $a = \omega^2 x$
 (c) $a = -\omega x$ (d) $a = -\omega^2 x$ (d)

32. How many times should be the length of a simple pendulum if the time period is to be doubled?
 (a) $\frac{1}{4}$ (b) $\frac{1}{2}$ (c) 2 (d) 4 (d)

33. How will be the time period of a simple pendulum if it's taken to the Moon surface?
 (a) Faster (b) Slower
 (c) Remain same (d) Become still (b)

34. What kind of shape does the L vs. T^2 graph have?
 (a) Hyperbola
 (b) Line passing through the origin
 (c) L-axis intersecting line
 (d) T^2 -axis intersecting line (b)



35. The change of displacement with time of a particle in simple harmonic oscillation motion is shown in the above figure. What is the angular frequency of the particle?

- (a) $2\pi/5$ (b) $2\pi/10$ (c) $2\pi/20$ (d) $2\pi/40$ (b)

36. An oscillating particle has —
 (a) maximum velocity at maximum amplitude
 (b) maximum acceleration at equilibrium point
 (c) increasing total energy
 (d) a still total energy (d)

37. What is the value of the gravitational acceleration on Moon surface?
 (a) $9.8 \text{ m}\cdot\text{s}^{-2}$ (b) $4.9 \text{ m}\cdot\text{s}^{-2}$
 (c) $19.6 \text{ m}\cdot\text{s}^{-2}$ (d) $1.93 \text{ m}\cdot\text{s}^{-2}$ (d)

38. If the amplitude and frequency of a simple pendulum is 0.01 m and 12 Hz, then what is the maximum velocity of the bob?
 (a) $0.65 \text{ m}\cdot\text{s}^{-1}$ (b) $5.02 \text{ m}\cdot\text{s}^{-1}$
 (c) $0.75 \text{ m}\cdot\text{s}^{-1}$ (d) $2.5 \text{ m}\cdot\text{s}^{-1}$ (c)

39. What kind of change occurs in time period of a simple pendulum when temperature rises?
 (a) Decreases (b) Increases
 (c) Stays same (d) Becomes zero (b)

40. What will be the time period if a child of 15kg weight rides a swing of 4m length?
 (a) 2sec (b) 4 sec (c) 8 sec (d) 16 sec (b)

41. What is the value of the angular velocity of a simple harmonic particle?
 (a) $\sqrt{k/l}$ (b) $\sqrt{k/m}$ (c) $\sqrt{m/k}$ (d) $\sqrt{k/g}$ (b)

42. A simple pendulum makes tick sound once every 0.9 sec. What is the effective length of the pendulum?
 (a) 0.704 m (b) 0.804 m (c) 0.904 m (d) 1.004 m (b)

43. The effective length of a simple pendulum with 0.5 Hz frequency is ($g = 9.8 \text{ m/s}^2$) —
 (a) 3.14 m (b) 0.98 m
 (c) 0.90 m (d) 0.993 m (d)

44. What is called the maximum displacement from the equilibrium of a simple harmonic particle?
 (a) Acceleration (b) Time period
 (c) Velocity (d) Amplitude (d)

45. A particle in simple harmonic motion has —
 i. maximum potential energy = $\frac{1}{2} kA^2$
 ii. maximum kinetic energy = $\frac{1}{2} kA^2$
 iii. maximum mechanical energy = $\frac{1}{2} kA^2$

Which of the following is correct?

- (a) i and ii (b) ii and iii
 (c) i and iii (d) i, ii and iii (d)

46. In simple harmonic motion — [S.B.-17]
 i. object acceleration is proportional to its displacement
 ii. acceleration is oriented towards a certain point
 iii. active force follows the law of reverse square

Which of the following is correct?

- (a) i and ii (b) i and iii
 (c) ii and iii (d) i, ii and iii (a)

47. Motion of an object in a tunnel along the diameter of the Earth is — [R.B.-16]
 i. Periodic ii. Oscillation
 iii. Linear

Which of the following is correct?

- (a) i and ii (b) ii and iii
 (c) i and iii (d) i, ii and iii (d)

48. In case of a particle in simple harmonic oscillation

— [Ctg.B.-16]

- i. Particle has maximum velocity at the equilibrium
- ii. Velocity decreases with the increase in displacement
- iii. Velocity is zero at the end of amplitude

Which of the following is correct?

- (a) i
- (b) iii
- (c) ii and iii
- (d) i, ii and iii

49. The event that happens when a pendulum clock is taken to the peak of a hill, the clock — [Ctg.B.-16]

- i. earns time
- ii. loses time
- iii. slows down

Which of the following is correct?

- (a) ii
- (b) iii
- (c) ii and iii
- (d) i, ii and iii

50. Velocity of a particle in simple harmonic oscillation is — [S.B.-16]

- i. maximum at the midpoint
- ii. zero at maximum displacement
- iii. minimum at equilibrium point

Which of the following is correct?

- (a) i and ii
- (b) ii and iii
- (c) i and iii
- (d) i, ii and iii

51. If a simple pendulum is taken inside a rotating artificial satellite then — [S.B.-15]

- i. gravitational acceleration 'g' will be zero
- ii. oscillation period will be infinite
- iii. the pendulum will be still

Which of the following is correct?

- (a) i and ii
- (b) i and iii
- (c) ii and iii
- (d) i, ii and iii

52. In case of a particle in simple harmonic oscillation,

$\frac{1}{2} KA^2$ is —

- i. maximum kinetic energy
- ii. maximum potential energy
- iii. total energy

Which of the following is correct?

- (a) i and ii
- (b) ii and iii
- (c) i and iii
- (d) i, ii and iii

53. The following thought regarding the relation between simple pendulum motion and circular motion is — [C.B.-15]

- i. Amplitude of simple pendulum motion is equal to the radius of circle
- ii. Time period of uniform circular motion is the same as the time period of simple pendulum motion
- iii. Angular frequency of simple pendulum motion is not the same as the angular velocity of uniform circular motion

Which of the following is correct?

- (a) i and ii
- (b) i and iii
- (c) ii and iii
- (d) i, ii and iii

54. If oscillation occurs in an object, then that oscillation in the air —

- i. creates periodic compression and expansion
- ii. progresses in the form of transverse wave
- iii. progresses in the form of longitudinal wave

Which of the following is correct?

- (a) i and ii
- (b) ii and iii
- (c) i and iii
- (d) i, ii and iii

55. In case of the energy of a rotating particle in simple harmonic motion —

i. Maximum kinetic energy = $\frac{1}{2} kA^2$

ii. Maximum potential energy = $\frac{1}{2} kA^2$

iii. Total mechanical energy = $\frac{1}{2} kA^2$

Which of the following is correct?

- (a) i and ii
- (b) ii and iii
- (c) i and iii
- (d) i, ii and iii

56. Applied acceleration in case of simple harmonic oscillation will be —

- i. more displacement for more acceleration
- ii. less displacement for less acceleration
- iii. always act to the opposite direction of displacement

Which of the following is correct?

- (a) i and ii
- (b) i and iii
- (c) ii and iii
- (d) i, ii and iii

57. The phase of a particle in simple harmonic oscillation explains — of the particle.

- i. angular velocity
- ii. overall state of motion
- iii. displacement, velocity, acceleration, force etc.

Which of the following is correct?

- (a) i and ii
- (b) i and iii
- (c) ii and iii
- (d) i, ii and iii

58. L vs. T² graph —

- i. passes through the origin
- ii. a straight line
- iii. a parabola

Which of the following is correct?

- (a) i and ii
- (b) i and iii
- (c) ii and iii
- (d) i, ii and iii

59. In case of a simple harmonic object particle —

- i. total energy is constant for a certain amplitude
- ii. total energy is square proportional to the amplitude
- iii. total energy is proportional to the force constant

Which of the following is correct?

- (a) i and ii
- (b) i and iii
- (c) ii and iii
- (d) i, ii and iii

Read the following stem and answer question no. 60 and 61:

The string length of a simple pendulum is 79.2 cm and radius of the bob is 0.8 cm. (Gravitational acceleration is 9.8ms^{-2} .)

60. How much is the time period of the pendulum?

[Ctg.B.-17]

- (a) 0.5077 s
- (b) 0.5129 s
- (c) 0.8976 s
- (d) 1.7952 s

61. If the pendulum is converted to a second pendulum then — [B.B.-17]

- i. the pendulum will work faster
- ii. time period will be 2 sec
- iii. string length should be increased by 19.29 cm

Which of the following is correct?

- (a) i and ii
- (b) i and iii
- (c) ii and iii
- (d) i, ii and iii

Read the following stem and answer question no. 62 and 63:

The mass of an object particle in simple harmonic oscillation is 100 gm, force constant is $1000\text{N}\cdot\text{m}^{-1}$.

62. Displacement from equilibrium at time

$t = 0$ is 5 cm; what will be its displacement at time $t = \frac{2\pi}{100}$ s?

- (a) 2.5 cm
- (b) 5 cm
- (c) 10 cm
- (d) 15 cm

63. The object particle has —
 i. 15.924 Hz frequency
 ii. $100 \text{ rad}\cdot\text{s}^{-1}$ angular frequency
 iii. 0.0628 s time period

Which of the following is correct?

- (a) i (b) ii
 (c) i and iii (d) i, ii and iii

Read the following stem and answer question no. 64 and 65:

Displacement of a particle in simple pendulum motion is, $x = \sqrt{3} \sin 2\pi t$ meter. [R.B.-16]

64. How much is the time period of the oscillation of the particle?

- (a) 0.5 sec (b) 1 sec (c) 2 sec (d) 2π sec

65. What is the ratio of the kinetic energy and potential energy of the particle 1 m away from the

equilibrium?

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

Read the following stem and answer question no. 66 and 67:

The equation of particle in simple harmonic motion is $y = 10 \sin(\omega t + \delta)$, time period = 30 sec and initial displacement = 5 cm.

66. How much is the angular frequency of the particle? [C.B.-15]

- (a) $\frac{\pi}{2} \text{ rads}^{-1}$ (b) $\frac{\pi}{4} \text{ rads}^{-1}$
 (c) $\frac{\pi}{12} \text{ rads}^{-1}$ (d) $\frac{\pi}{15} \text{ rads}^{-1}$

67. Which is the maximum velocity of the particle? [C.B.-15]

- (a) 3.14 ms^{-1} (b) 2.09 ms^{-1}
 (c) 1.04 ms^{-1} (d) -28 ms^{-1}

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