QB365 Question Bank Software Study Materials

Oscillations 50 Important 1 Marks Questions With Answers (Book Back and Creative)

11th Standard

Physics

Total Marks : 50

Multiple Choice Question

50 x 1 = 50

1) In a simple harmonic oscillation, the acceleration against displacement for one complete oscillation will be

(a) an ellipse (b) a circle (c) a parabola **(d) a straight line**

2) A particle executing SHM crosses points A and B with the same velocity. Having taken 3 s in passing from A to B, it returns to B after another 3 s. The time period is

(a) 15 s (b) 6 s **(c) 12 s** (d) 9 s

3) The length of a second's pendulum on the surface of the Earth is 0.9 m. The length of the same pendulum on surface of planet X such that the acceleration of the planet X is n times greater than the Earth is

(a) 0.9n (b) $\frac{0.9}{n}$m (c) $0.9n^2$m (d) $\frac{0.9}{n^2}$

4) A simple pendulum is suspended from the roof of a school bus which moves in a horizontal direction with an acceleration a, then the time period is

(a) $T \propto \frac{1}{g^2+a^2}$ **(b)** $T \propto \frac{1}{\sqrt{g^2+a^2}}$ (c) $T \propto \sqrt{g^2+a^2}$ (d) $T \propto \left(g^2+a^2\right)$

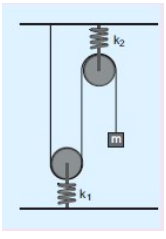
5) Two bodies A and B whose masses are in the ratio 1:2 are suspended from two separate massless springs of force constants k_A and k_B respectively. If the two bodies oscillate vertically such that their maximum velocities are in the ratio 1:2, the ratio of the amplitude A to that of B is

(a) $\sqrt{\frac{K_B}{2K_A}}$ **(b)** $\sqrt{\frac{K_B}{8K_A}}$ (c) $\sqrt{\frac{2K_B}{K_A}}$ (d) $\sqrt{\frac{8K_B}{K_A}}$

6) A spring is connected to a mass m suspended from it and its time period for vertical oscillation is T. The spring is now cut into two equal halves and the same mass is suspended from one of the halves. The period of vertical oscillation is

(a) T'= $\sqrt{2}$T **(b)** $T' = \frac{T}{\sqrt{2}}$ (c) T'=$\sqrt{2T}$ (d) $T' = \sqrt{\frac{T}{2}}$

7) The time period for small vertical oscillations of block of mass m when the masses of the pulleys are negligible and spring constant k_1 and k_2 is



(a) $T = 4\pi\sqrt{m\left(\frac{1}{k_1}+\frac{1}{k_2}\right)}$ (b) $T = 2\pi\sqrt{m\left(\frac{1}{k_1}+\frac{1}{k_2}\right)}$ (c) $T = 4\pi\sqrt{m\left(k_1+k_2\right)}$ (d) $T = 2\pi\sqrt{m\left(k_1+k_2\right)}$

8) A simple pendulum has a time period T_1. When its point of suspension is moved vertically upwards according as $y = k t^2$, where y is vertical distance covered and k = 1 ms^{-2}, its time period becomes T_2. Then, $\frac{T_1^2}{T_2^2}$ is (g = 10 m s^{-2}).

(a) $\frac{5}{6}$ (b) $\frac{11}{10}$ **(c)** $\frac{6}{5}$ (d) $\frac{5}{4}$

9) An ideal spring of spring constant k, is suspended from the ceiling of a room and a block of mass M is fastened to its lower end. If the block is released when the spring is un-stretched, then the maximum extension in the spring is

(a) $4\frac{Mg}{k}$ (b) $\frac{Mg}{k}$ **(c)** $\mathbf{2}\frac{Mg}{k}$ (d) $\frac{Mg}{2k}$

10) A pendulum is hung in a very high building oscillates to and fro motion freely like a simple harmonic oscillator. If the acceleration of the bob is 16 ms^{-2} at a distance of 4 m from the mean position, then the time period is

(a) 2 s (b) 1 s (c) 2π s **(d) π s**

11) A hollow sphere is filled with water. It is hung by a long thread. As the water flows out of a hole at the bottom, the period of oscillation will

(a) first increase and then decrease (b) first decrease and then increase (c) increase continuously

(d) decrease continuously

12) The damping force on an oscillator is directly proportional to the velocity. The units of the constant of proportionality are

(a) $kgms^{-1}$ (b) $kgms^{-2}$ **(c) kgs^{-1}** (d) kgs

13) When a damped harmonic oscillator completes 100 oscillations, its amplitude is reduced to $\frac{1}{3}$ of its initial value. What will be its amplitude when it completes 200 oscillations?

(a) $\frac{1}{5}$ (b) $\frac{2}{3}$ (c) $\frac{1}{6}$ **(d) $\frac{1}{9}$**

14) A particle executes simple harmonic motion and displacement y at time t_0, $2t_0$ and $3t_0$ are A, B and C, respectively. Then the value of $\frac{A+C}{2B}$ is

(a) cos ωt_0 (b) cos $2\omega t_0$ (c) cos $3\omega t_0$ (d) 1

15) A mass of 3 kg is attached at the end of a spring moves with simple harmonic motion on a horizontal frictionless table with time period 2π and with amplitude of 2m, then the maximum fore exerted on the spring is

(a) 1.5 N (b) 3 N **(c) 6 N** (d) 12 N

16) The displacement of a simple harmonic motion is given by y(t) = A sin (ωt + ϕ) where A is amplitude of the oscillation, ω is the angular frequency and ϕ is the phase. Let the amplitude of the oscillation be 8 cm and the time period of the oscillation is 24s. If the displacement at initial time (t = 0s) is 4cm, then the displacement at t = 6s is

(a) 8 cm (b) 4 cm (c) $4\sqrt{3}$ cm **(d) $8\sqrt{3}$ cm**

17) Let the total energy of a particle executing simple harmonic motion with angular frequency is 1 rad s^{-1} is 0.256J. If the displacement of the particle at time t = $\frac{\pi}{2}$s is $8\sqrt{2}$ cm then the amplitude of motion is

(a) 8 cm **(b) 16 cm** (c) 32 cm (d) 64 cm

18) The function x =A$\sin^2\omega t$ + B $\cos^2\omega t$ + c sin rot cos rot represents simple harmonic motion for which of the option?

(a) for all values of A, B & C (C# 0) (b) $\frac{r}{10}$ (b) A=B, C = 2B (c) CA = -B, C = 2B **(d) all of the above**

19) A particle executing simple harmonic motion along y-axis has its motion described by the equation y = A.sin (ωt) + B, the amplitude of the example harmonic motion is _____.

(a) A (b) B (c) A+B (d) $\sqrt{A+B}$

20) The phase difference between the unstantaneous velocity & acceleration of a particle executing simple harmonic motion is _____.

(a) 0.5 π (b) π (c) 0.707π (d) 0.61 m

21) The magnitude of acceleration of particle executing SHM at the position of maximum displacement is _____.

(a) zero (b) minimum **(c) maxmium** (d) none of these

22) Find the length of a simple pendulum whose period is 2.00 s _____.

(a) 2 m (b) 0.4 m **(c) 0.1 m** (d) 3 m

23) The three springs with force constant $k_1 = 8\frac{N}{m}, k_2 = 10\frac{N}{m}, k_3 = 12\frac{N}{m}$, are connected in series to a mass of 0.500. The mass is then pulled to the right and released. Then the period of the motion is _____.

(a) 2s (b) 2.2s **(c) 2.5s** (d) 3.1s

24) A particle executing a SHM has a maximum displacement of 2 cm its acceleration at a distance of 0.5 cm from its mean position is 2 cm/s^2, What will be its velocity when it is at a distance of 1 cm from its mean position?

(a) 4 cm/s **(b) $2\sqrt{3}$** (c) 11.2 cm/s (d) $4\sqrt{7}$

25) A particle is executing SHM. Then the graph of acceleration as a function of displacement is _____.

(a) straight line (b) circle (c) ellipse (d) hyperbola

26) The amplitude of a vibrating body situated in a resisting medium _____.

(a) decreases linearly with time **(b) decreases exponentially with time** (c) decreases with time in some other manner

(d) remains constant with time

27) The frequency of a vibrating body situated in air _____

(a) is the same as its natural frequency (b) is higher than its natural frequency **(c) is lower than its natural frequency**

(d) can have any value

28) The equation $\frac{2^2y}{dy^2} + b\frac{dy}{dt} + \omega^2 y = 0$ represents the equation of motion for a _____ vibration.

(a) free **(b) damped** (c) forced (d) resonant

29) The maximum displacement of a particle executing SHM is 1 cm and the maximum acceleration is $(1.57)^2$ cm/s^2. Its time period is _____.

(a) 0.25 s **(b) 4.0 s** (c) 1.57 s (d) 3.14 s

30) A girl is swinging on a swing in the sitting position. How will the period of swing be affected if she stands up?

(a) The period will now he shorter (b) The period will now be longer (c) The period win remain unchanged

(d) The period may become longer or shorter depending upon the height of the girl

31) The amplitude of a damped oscillator becomes half in one minute. The amplitude after 3 minutes will be $\frac{1}{x}$ time the original, where x is _____.

(a) 2×3 **(b) 2^3** (c) 3^2 (d) 2×2^2

32) When the potential energy of a particle executing simple harmonic motion is one-fourth of its maximum value during the oscillation, the displacement of the particle from the equilibrium position in terms of its amplitude a is _____.

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

33) A massless spring, having force constant k, oscillates with a frequency n when a mass m is suspended from it. The spring is cut into two equal halves and a mass 2m is suspended from one of the parts. The frequency of oscillation will now be _____

(a) n **(b) $n\sqrt{2}$** (c) $\frac{n}{\sqrt{2}}$ (d) 2 n

34) A particle is oscillating according to the equation x = 5 cos (0.5 1t t) where t is in seconds. The particle moves from the position of equilibrium to the position of maximum displacement in time _____.

(a) 1 s (b) 2 s **(c) 0.5 s** (d) 4 s

35) If the displacement of a particle executing SHM, is given by y = 0.30 sin (220t + 0.64) in metre, then the frequency and the maximum velocity of the particle are (t is in seconds) _____.

(a) 35 Hz, 66 m/s (b) 45 Hz, 66 m/s (c) 58 HZ, 113 m/s (d) 35Hz, 132 m/s

36) Masses m_A and m_B hanging from the ends of strings of lengths I_A and I_B are executing. Simple harmonic motions. If their frequencies are related as $f_A = 2/_B$ then _____.

(a) $I_A = 2/_B$ and $m_A = m_B/2$ (b) $I_A = 4/_B$ regardless of masses **(c) $l_A = I_B/4$ regardless of masses.**

(d) $I_A = 2/_B$ and $m_A = 2m_B$

37) Two simple harmonic motions act on a particle. These harmonic motions are x = A cos (ωt+&); Y = A cos (ωt + ∝) When &= ∝+$\frac{\pi}{2}$, the resulting motion is _____.

(a) A circle and the actual motion is clockwise (b) an ellipse and the actual motion is counter clockwise

(c) a ellipse and the actual motion is clockwise **(d) a circle and the actual motion is counter clockwise**

38) The period of oscillation of a simple pendulum is T in a stationary lift. If the lift moves upwards with an acceleration of 8g, the period will _____.

(a) remain the same (b) decrease by T/2 **(c) increase by T/3** (d) none of these

39) A particle executing simple harmonic motion of amplitude 5 cm has maximum speed of 31.4 cm/s. The frequency of its oscillation is _____.

(a) 3 Hz (b) 4 Hz (c) 2 Hz **(d) 1 Hz**

40) The phase difference between displacement and acceleration of a particle executing simple harmonic motion is

(a) 0.707π **(b) π** (c) 0.5π (d) 2π

41) Which of the following statement is correct? In simple harmonic motion _____ of a particle remains constant.

(a) kinetic energy (b) velocity (c) potential energy **(d) frequency**

42) If both spring constants k_1 and of two springs are connected in series increased is 6 k_1 and 10 k_2 respectively, then the new frequency of the system in terms of original frequency f is

(a) 2f (b) f **(c) 4f** (d) 8f

43) The length of seconds pendulum is

(a) 1 m (b) 3 m **(c) 0.99 m** (d) 2 m

44) A simple pendulum oscillates with a time period T. If the length of the pendulum is increased by 21% then the increase in time period of the pendulum of increased length is

(a) 42% (b) 21% (c) 31.5% **(d) 10.5%**

45) Vibration in a stretched string are examples of

(a) damped oscillations **(b) free oscillations** (c) forced oscillations (d) maintained oscillations

46) **Assertion:** In simple harmonic motion the velocity is maximum when the acceleration is minimum.
Reason: The displacement and velocity of a body executes S.H.M differ in phase by π. Select the correct statement of the following?

(a) Assertion and reason are true and reason explains assertion correctly.

(b) Assertion and reason are true but reason does not explain assertion correctly.

(c) Assertion is true but reason is false. (d) Assertion is false but reason is false

47) The potential energy of a simple harmonic oscillator when the particle is half way to its end point is

(a) $\frac{E}{2}$ (b) $\frac{3E}{4}$ **(c)** $\frac{E}{4}$ (d) 2 E

48) For a satellite moving in an orbit around the earth, the ratio of kinetic energy to potential energy is

(a) 2 (b) $\sqrt{2}$ **(c)** $\frac{1}{2}$ (d) $\frac{1}{\sqrt{2}}$

49) A body of mass 20 kg moving with a speed of 10 ms^{-1} on a horizontal smooth surface collides. with a massless spring of spring constant 5 N/m. If the mass stops after collision, distance of compression of the spring will be

(a) 10 m (b) 50 m (c) 5 m **(d) 20 m**

50) 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:

(a) 11 (b) 9 (c) 10 (d) 8