PHYSICS

BOOKS - NIKITA PHYSICS (HINGLISH)

OSCILLATIONS

MCQ

1. A particle is moving in a circle with a constant speed. Its moving is

A. Periodic

B. Oscillatory

C. Simple harmonic

D. both 'a' and 'b'

Answer: A

Watch Video Solution

2. A particle moves in a circular path with a continuously increasing speed. Its motion is

A. nonperiodic

B. Oscillatory

C. Simple harmonic

D. UCM

Answer: B

Watch Video Solution

3. A system executing SHM must possesses

A. inertia only

B. restoring force only

C. both restoring force and inertia

D. only external force

Answer: C

Watch Video Solution

4. The displacement (from intial position) of a particle executing SHM with amplitude A in half the time period is always

A. Zero

B. A

C. $A/2$

D. any thing from 0 to 2A

Answer: D

Watch Video Solution

5. The displacement (from intial position) of a particle executing SHM with amplitude A in half the time period is always

A. Zero

B. A

C. 2A

D. 4A

Answer: A

Watch Video Solution

6. If a particle is executing SHM, with an amplitude A, the distance moved and the displacement of the body during its time period is

A. 4A

B. 2A

C. A

D. Zero

Answer: A

Watch Video Solution

7. The motion of a particle in SHM of

A. uniform speed

B. uniform acceleration

C. uniform velocity

D. non uniform speed

Answer: D

Watch Video Solution

8. Simple harmonic oscillations are

A. one dimensional

B. three dimensional

C. two dimensional

D. four dimensional

Answer: A

Watch Video Solution

9. A body is said to be in simple linear harmonic motion (S.H.M.) about a fixed point, if

(A) it moves along a straight line

(B) it's acceleration is directed towards a fixed point

(C) the restoring force acting on it, is directly proportional to its displacement and both are oppositely directed.

(D) the direction of force and displacement varies periodically

The correct statements is / are

A. A and B only

B. B and C only

C. A, B and C

D. A, B, C and D

Answer: D

Watch Video Solution

10. In a simple harmonic motion, the restoring force or restoring acceleration is directly proportional to

A. the displacement and both are in the same direction

B. the displacement and both are oppositely directed

C. the angular displacement and both are in the same direction

D. the angular displacement and both are in the opposite direction

Answer: B

Watch Video Solution

11. If the motion of an object repeats itself at regular intervals of time , it is called ______ motion .

A. non oscillatory motion

B. non periodic motion

C. periodic motion

D. periodic and oscillatory motion

Answer: C

Watch Video Solution

12. The oscillatory motion is simple harmonic motion since

A. its path is straight line

B. its displacement, velocity and acceleration are represented by trigonometric function sine and cosine

C. its displacement, velocity and acceleration are represented by trigonometric function sine, cosine and tangent

D. both 'a' and 'b'

Answer: D

Watch Video Solution

13. In ideal simple harmonic motion, the constant quantity is

A. amplitude

B. kinetic energy

C. potential energy

D. force

Answer: A

Watch Video Solution

14. Assertion : All oscillatory motions are necessarily periodic motion but all periodic motion are not oscillatory.

Reason : Simple pendulum is an example of oscillatory motion.

A. all periodic motions are not oscillatory

B. all periodic motions are oscillatory

C. all oscillatory motions are not periodic motion

D. all periodic motions are non harmonic

Answer: A

Watch Video Solution

15. A particle is moving in a circle with uniform speed its motion is

A. periodic and simple harmonic

B. a periodic

C. periodic but not simple harmonic

D. non periodic but simple harmonic

Answer: C

Watch Video Solution

16. In simple harmonic motion, the quantities are not constant

A. amplitude and frequency

B. potential energy and kinetic energy

C. total energy and propagation constant

D. path length

Answer: B

Watch Video Solution

17. The necessary and sufficient condition for S.H.M. is

A. constant period and inertial property

B. constant acceleration and elasticity property

C. proportionality between equilibrium position in opposite direction

D. periodic and harmonic

Answer: C

Watch Video Solution

18. Periodic motion is called harmonic motion, since

A. the expressions of displacement, velocity, and acceleration containing sine and cosine function and it oscillates with unique frequency

B. the expressions of displacement, velocity, and acceleration containing cosine and tangent function

C. it performs motion with unique frequency

D. straight line, to and fro motion

Answer: A

Watch Video Solution

19. When the amplitude of a particle executing S.H.M. is increased slightly its period

A. increases

B. remains unchanged

C. decreases

D. may increase or decrease

Answer: B

Watch Video Solution

20. The position at which the net force on the oscillating particle is zero, the postion is

A. mean position

B. equilibrium position

C. extreme position

D. both 'a' or 'b'

Answer: D

Watch Video Solution

21. The constant of proportionality of a particle performing S.H.M. depends upon

A. elastic properties of string

B. the dimensions of displacement

C. the dimensions of force

D. the dimensions of displacement and force

Answer: A

Watch Video Solution

22. The condition for oscillations of the body is

A. intertial property

B. applied force

C. elastic property

D. inertial and elasticity property

Answer: D

Watch Video Solution

23. A particle performing S.H.M. with the initial phase angle is $\pi/2$. Then the particle is at

A. maximum displacement position

B. minimum energy position

C. maximum velocity position

D. minimum acceleration

Answer: A

Watch Video Solution

24. A package is on a platform vibrates vertical in S.H.M. with a period of 0.5 s. The package can lose contact with the platform

A. if a mass exceeds a certain limit

B. at the highest point of its motion

C. at the lowest point of its motion

D. any position of the package

Answer: B

Watch Video Solution

25. A person is standing on a platform which executing vertical S.H.M. his weight be largest at

A. the highest position

B. at the equilibrium position

C. at the lowest position

D. midway between highest point and mean position

Answer: C

Watch Video Solution

26. The distance covered by a particle executing S.H.M. in one complete oscillation is

A. A

B. $A/2$

C. $2A$

D. $4A$

Answer: D

Watch Video Solution

27. Which of the followin is not essential for S.H.M.?

A. inertia

B. restoring force

C. material medium

D. gravity

Answer: C

Watch Video Solution

28. The quantity which does not vary periodically for a particle performing SHM is

A. displacement

B. acceleration

C. total energy

D. velocity

Answer: C

Watch Video Solution

29. If a hole is drilled along the diameter of the earth and you leave a coin in the hole, then

A. it falls off and leaves the earth

B. it falls off and finally stops at the centre of the earth

C. it falls off but does not leave the earth

D. it falls and comes back to you

Answer: D

Watch Video Solution

30. If a hole is bored along the diameter of the earth and a stone is dropped into hole

A. reaches the centre of the earth and stops

B. reaches the other side of the earth and stops

C. executes simple harmonic motion about the centre of the earth

D. reaches the other side of the earth and escapes into space

Answer: C

Watch Video Solution

31. The dimensions of force constant 'k' are

A. $[L^1M^1T^{-2}]$

B. $[L^0M^1T^{-2}]$

C. $[L^1M^0T^{-2}]$

D. $[L^1M^1T^{-1}]$

Answer: B

Watch Video Solution

32. A particle performing linear S.H.M., the kinematical equations of motion are not applied to solve the problems, of S.H.M. since

A. velocity of the particle in linear S.H.M. is not uniform

B. acceleration of the particle in linear S.H.M. is not uniform

C. displacement of the particle in linear S.H.M. is proportional to force

D. force acting on the particle is not uniform

Answer: B

Watch Video Solution

33. When a mass undergoes simple harmonic motion, there is always a constant ratio between its displacement and

A. period

B. mass

C. acceleration

D. velocity

Answer: C

Watch Video Solution

34. The force and acceleration in S.H.M. changes in direction over a period

A. periodically with quarter period

B. twice in a period

C. periodically with period half of the motion

D. both 'b' and 'c'

Answer: B

Watch Video Solution

35. Which of the following equation does not represent a simple harmonic motion

A. $x = A \sin \omega t$

B. $x = A \cos \omega t$

C. $x = A \sin \omega t + B \cos \omega t$

D. $x = A \tan \omega t$

Answer: D

Watch Video Solution

36. Which one of the following is a simple harmonic motion

A. Wave moving through a string fixed at both ends

B. Earth spinning about its own axis

C. Ball bouncing between two rigid vertical wall

D. Particle moving in a circle with uniform speed

Answer: A

Watch Video Solution

Watch Video Solution

37. When the displacement of a particle in SHM from the mean position is 4 cm, the force acting on the particle is 6 N. Then the force acting on it when its displacement is 6 cm from the mean positio is

A. 3 N

B. 16 N

C. 8 N

D. 9 N

Answer: D

Watch Video Solution

38. Displacement 'x' of a simple harmonic oscillator varies with time, according to the differential equation $\left(d^2x/dt^2\right) + 4x = 0$. Then its time period is

A. $\pi/2s$

B. πs

C. $2\pi s$

D. $4\pi s$

Answer: B

Watch Video Solution

39. If a body of mass 1 gm execute linear S.H.M. with a frequency of 5 oscillations per second and an amplitude 1cm, then the magnitude of force at the extreme position will be

A. zero

B. 987 dyne

C. 10^3 dyne

D. 10^2 dyne

Answer: B

Watch Video Solution

40. The time period of a particle executing S.H.M. is 1 s. If the particle starts motion from the mean position, then the time during which it will be at mid way between mean and extreme position will be

A. $1/6s$

B. $1/4s$

C. $1/12s$

D. $3/2s$

Answer: C

Watch Video Solution

41. If a simple harmonic motion is represented by $\frac{d^2x}{dt^2} + \alpha x = 0$, its time period is :

A. $2\pi\alpha$

B. $2\pi\sqrt{\alpha}$

C. $\frac{2\pi}{\alpha}$

D. $\frac{2\pi}{\sqrt{\alpha}}$

Answer: D

Watch Video Solution

42. A small body of mass 0.10 kg is executing S.H.M. of amplitude 1.0 m and period 0.20 sec . The maximum force acting on it i

A. 98.7 N

B. 985.96 N

C. 100.2 N

D. 76.23 N

Answer: A

Watch Video Solution

43. 1 kg weight is suspended to a weightless spring and it has time period T. If now 4 kg weight is suspended from the same spring the time period will be

A. T

B. $T/2$

C. $2T$

D. $4T$

Answer: C

Watch Video Solution

44. Projection of U.C.M. along its any diameter is

A. linear S.H.M.

B. angular S.H.M.

C. neither linear S.H.M. nor angular S.H.M.

D. complex oscillatory motion

Answer: A

Watch Video Solution

45. The phase angle between the two projections of uniform circular motion on any two mutually perpendicular diameter is

A. zero

B. $\pi / 2$

C. $3\pi / 4$

D. π

Answer: B

Watch Video Solution

46. When two particles performing SHM of same amplitude and frequency arriving at a point of medium simultaneously with phase difference of $\pi/2$, then the resultant path is

A. parabolic

B. elliptical

C. circle

D. straight line

Answer: C

Watch Video Solution

47. The velocity of a particle performing S.H.M. at mean position is

A. maximum

B. half of the maximum

C. minimum

D. zero

Answer: A

Watch Video Solution

48. The velocity of a particle performing S.H.M. at extreme position is

A. minimum

B. constant

C. maximum

D. half of the maximum velocity

Answer: A

Watch Video Solution

49. The acceleration of a particle performing S.H.M. at extreme position is

A. minimum

B. constant

C. maximum

D. in between maximum and minimum

Answer: C

Watch Video Solution

50. The acceleration of a particle performing S.H.M. at mean position is

A. minimum or zero

B. constant

C. maximum

D. half of the maximum

Answer: A

Watch Video Solution

51. The particle performing S.H.M., about mean position it has

A. maximum acceleration and maximum velocity

B. minimum acceleration and maximum velocity

C. maximum acceleration and minimum velocity

D. minimum acceleration and minimum velocity

Answer: B

Watch Video Solution

52. The graph between instantaneous velocity and acceleration of a particle performing S.H.M. is

A. parabola

B. straight line

C. ellipse

D. circle

Answer: C

Watch Video Solution

53. The graph between instantaneous velocity and acceleration of a particle performing S.H.M. with a period of 6.28 s is

A. parabola

B. straight line

C. ellipse

D. circle

Answer: D

Watch Video Solution

54. Graph between velocity and displacement of a particle, executing S.H.M. is

A. parabola

B. straight line

C. ellipse

D. circle

Answer: C

Watch Video Solution

55. The graph between instantaneous velocity and displacement of a particle performing S.H.M.with period $2\pi \sec \quad \text{or} \quad \omega = 1$ is

A. parabola

B. straight line

C. ellipse

D. circle

Answer: D

Watch Video Solution

56. The graph between instantaneous velocity and angular displacement of a particle performing S.H.M. is

A. parabola

B. straight line

C. sinusoidal

D. circle

Answer: C

Watch Video Solution

57. The graph between instantaneous acceleration and angualr displacement of a particle performing S.H.M. is

A. parabola

B. straight line

C. sinusoidal

D. circle

Answer: C

Watch Video Solution

58. A particle performing S.H.M., its velocity when the particle moves from mean to extreme position is

A. slower initially and faster laterally

B. uniformly moves

C. faster initially and momentraily falls to zero

D. fast moves and stop at extreme position

Answer: C

Watch Video Solution

59. The equation of a S.H.M. of amplitude 'A' and angular frequency ω in which all distances are measured from one extreme positionand time is taken to be zero, at the other extreme position is

A. $x = A\sin\omega t$

B. $x = A - A\sin\omega t$

C. $x = A\cos\omega t$

D. $x = A - A\cos\omega t$

Answer: D

Watch Video Solution

60. A particle performing S.H.M. about equilibrium position. Then the velocity of the particle is

A. slower from mean to extreme position

B. faster from mean to extreme position

C. slower initial from mean position and faster lateral and stop at the end

D. faster initil from mean position and later on falls off, suddenly

Answer: D

Watch Video Solution

61. Acceleration amplitude of a particle performing S.H.M. is the product of

A. amplitude and velocity

B. amplitude and acceleration

C. amplitude and square of angular velocity

D. square of amplitude and angular velocity

Answer: C

Watch Video Solution

62. The ratio of the maximum velocity and maximum displacement of a particle executing simple harmonic motion is equal to

A. ω

B. T

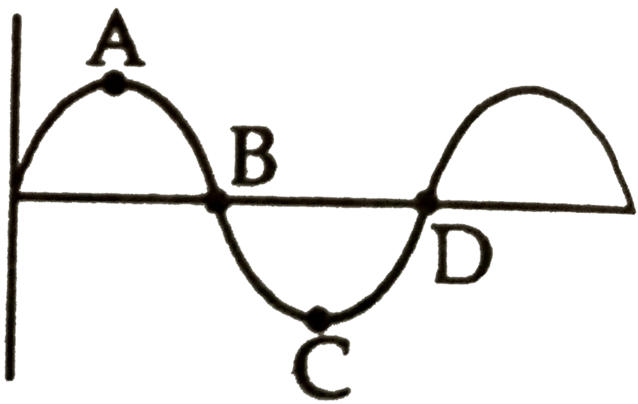
C. g

D. n

Answer: A

Watch Video Solution

63. The figure gives the displacement versus time graph of a simple harmonic oscillator. The position with maximum speed directed down wards is at



A. A

B. B

C. C

D. D

Answer: B

Watch Video Solution

64. The differential equation of angular S.H.M. is in the order of

A. 2

B. 0

C. 3

D. 1

Answer: A

Watch Video Solution

65. A particle performing S.H.M. with amplitude 'A' and period T. The average values of magnitude of distance over a half period is

A. depends upon periodic time

B. depends upon amplitude of motion

C. independents upon path of the particle

D. b' and 'c'

Answer: B

View Text Solution

66. The frequency of oscillation of a particle executing SHM with amplitude A and having velocity 'v' at the mean position is

A. $\frac{v}{2\pi A}$

B. $\frac{v}{A}$

C. $\frac{A}{v}$

D. $\frac{2\pi A}{v}$

Answer: A

Watch Video Solution

67. A particle executing linear S.H.M. performs 30 oscillations per minute. It's velocity when passing through the middle of its path is 0.157 m/s. The length of the path is

A. 0.2 m

B. 0.5 m

C. 0.1 m

D. 500 cm

Answer: C

Watch Video Solution

68. A ball attached to a string travels in uniform circular motion in a horizontal circle of 50 cm radius in 1 s. Sun light shining on the ball throws its shadow on a wall. The velocity of the shadow at the centre of the path is

A. $\pi m / s$

B. $0.5\pi m / s$

C. $0.5 m / s$

D. $1m/s$

Answer: A

Watch Video Solution

69. A particle starts simple harmonic motion from the mean position. If It's amplitude is A and time period T, then at a certain instant, its speed is half of its maximum speed at this instant, the displacement is

A. $\frac{\sqrt{2}A}{3}$

B. $\frac{\sqrt{3}A}{2}$

C. $\frac{2A}{\sqrt{3}}$

D. $\frac{3A}{\sqrt{2}}$

Answer: B

Watch Video Solution

70. The initial phase of a simple harmonic oscillator is zero. At what fraction of the period, the velocity is half of its maximum value?

A. 1

B. $1/2$

C. $(2/3)$

D. $1/6$

Answer: D

Watch Video Solution

71. 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. 0.6 s

B. 0.4 s

C. 0.3 s

D. 0.2 s

Answer: B

Watch Video Solution

72. A particle starts S.H.M. from mean position along straight line and comes to rest momentraily at x = 1 m and t = 1 s. If the motion is simple harmonic, then the maximum acceleration will be $(\pi^2 = 10)$

A. $1m/s^2$

B. $4m/s^2$

C. $2.5m/s^2$

D. $7m/s^2$

Answer: C

Watch Video Solution

Watch Video Solution

73. The time period of S.H.M. is 16 seconds and it starts motion from the equililbrium position, after two seconds the velocity is $\pi m / s$. Then the displacement amplitude is

A. $\sqrt{2}m$

B. $2\sqrt{2}m$

C. $4\sqrt{2}m$

D. $8\sqrt{2}m$

Answer: D

Watch Video Solution

74. A particle is executing SHM of periodic time T the time taken by a particle in moving from mean position to half the maximum displacement is $(\sin 30^\circ = 0.5)$

A. $\frac{T}{2}s$

B. $\frac{T}{4}s$

C. $\frac{T}{6}s$

D. $\frac{T}{12}s$

Answer: D

Watch Video Solution

75. If a particle performing S.H.M. with a period of T s, then the time required to reach from midway to extreme position will be

A. $\frac{T}{2}s$

B. $\frac{T}{4}s$

C. $\frac{T}{6}s$

D. $\frac{T}{12}s$

Answer: C

Watch Video Solution

Watch Video Solution

76. The ratio of maximum acceleration to the maximum velocity of a particle performing S.H.M. is equal to

A. amplitude

B. angular velocity

C. square of amplitude

D. square of angular velocity

Answer: B

Watch Video Solution

77. A particle executes SHM with an amplitude of $0.2m$. Its displacement when its phase is 90° is

A. 0.1 m

B. 0.2 m

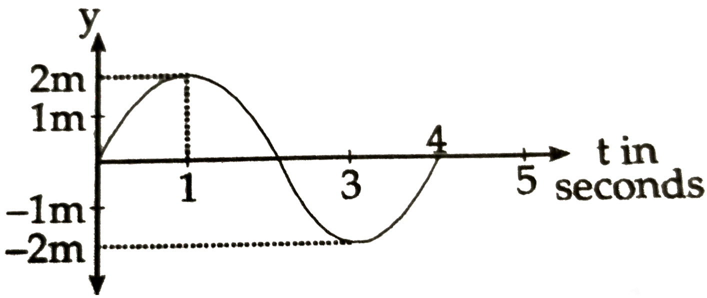
C. 0.4 m

D. $0.1/\sqrt{2}m$

Answer: B

Watch Video Solution

78. The displacement - time graph of a particle executing SHM is as shown in the figure. The maximum velocity of the particle is



A. $\pi m s^{-1}$

B. $2\pi m s^{-1}$

C. $4\pi m s^{-1}$

D. $2 m s^{-1}$

Answer: A

Watch Video Solution

79. A simple harmonic oscillator has a period of 0.01 sec and an amplitude of 0.2 m . The magnitude of the velocity in $m \sec^{-1}$ at the centre of oscillation is

A. π

B. 10π

C. 0.1π

D. 40π

Answer: D

Watch Video Solution

80. The particle performing S.H.M. about mean position, displacement and acceleration have initial phase difference of

A. $\pi / 2rad$

B. $3\pi / 2rad$

C. πrad

D. $2\pi rad$

Answer: C

Watch Video Solution

Watch Video Solution

81. A body is oscillating vertical about its mean position with period $\sqrt{3}$ s. If its maximum and minimum heights above the surface of the ground are 2 m and 1.5 m, then the speed at midway between mean and extreme position will be

A. $5m/s$

B. $\frac{\pi}{4}m/s$

C. $10m/s$

D. $\frac{\pi}{\sqrt{3}}m/s$

Answer: B

Watch Video Solution

82. If the maximum acceleration of a particle performing S.H.M. is numerically equal to twice the maximum velocity then the period will be

A. 1.57 s

B. 3.142 s

C. 6.28 s

D. 2 s

Answer: B

Watch Video Solution

83. The velocity of the particle midway between mean and extreme position, performing S.H.M. is

A. $A\omega$

B. $\frac{\sqrt{3}}{2}A\omega$

C. $\frac{2}{\sqrt{2}}A\omega$

D. $\sqrt{3}A\omega$

Answer: B

Watch Video Solution

84. The displacement x (in metre) of a particle in, simple harmonic motion is related to time t (in second) as

$$x = 0.01 \cos\left(\pi t + \frac{\pi}{4}\right)$$

the frequency of the motion will be

A. 0.5 Hz

B. 1 Hz

C. $\pi / 2Hz$

D. πHz

Answer: A

Watch Video Solution

85. A mass m attached to a light spring oscillates with a period of 2 s. If the mass is increased by 2 kg, the period increases by 1 s. Then the value of m is

A. 1 kg

B. 1.6 kg

C. 2 kg

D. 2.4 kg

Answer: B

Watch Video Solution

86. A simple harmonic motion of amplitude A has a time period T. The acceleration of the oscillator when its displacement is half the amplitude is

A. $\frac{4\pi^2 A}{T^2}$

B. $\frac{2\pi^2 A}{T^2}$

C. $-\frac{4\pi^2 A}{T^2}$

D. $-\frac{2\pi^2 A}{T^2}$

Answer: D

Watch Video Solution

87. A body oscillates with a simple harmonic motion having amplitude 0.05 m. At a certain instant of time, its displacement is 0.01 m and acceleration is $1.0m/s^2$. The period of oscillation is

A. 0.1 s

B. 0.2 s

C. $\pi/10s$

D. $\pi / 5s$

Answer: D

Watch Video Solution

88. The maximum velocity of the particle in the above problem at a distance of 10 m is

A. $0.25m / s$

B. $0.5m / s$

C. $0.75m / s$

D. $1m / s$

Answer: B

Watch Video Solution

89. The displacement x is in centimeter of an oscillating particle varies with time t in seconds as x = 2 cos $[0.05\pi t + (\pi / 3)]$. Then the magnitude of the maximum acceleration of the particle will be

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

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

C. $\frac{\pi^2}{200} cm / s^2$

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

Answer: C

Watch Video Solution

90. A particle executes S.H.M. of amplitude 25 cm and time period 3 s. 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. 0.25 s

B. 0.5 s

C. 0.75 s

D. 1 s

Answer: B

Watch Video Solution

91. A body executing linear simple harmonic motion has a velocity of 3 cm/s when its displacement is 4 cm and a velocity of 4 cm/s when its displacement is 3 cm. Then amplitude of oscillation with be

A. 5 cm

B. 7.5 cm

C. 10 cm

D. 12.5 cm

Answer: A

Watch Video Solution

92. The period of oscillation of the particle in the above problem is

A. 3.142 s

B. 6.28 s

C. 12.56 s

D. 9.426 s

Answer: B

Watch Video Solution

93. The average velocity of a particle executing SHM with an amplitude A and angular frequency ω during one oscillation is

A. ωA

B. $\frac{\omega A}{2}$

C. $2\omega A / \pi$

D. zero

Answer: D

Watch Video Solution

94. The speed of the particle on the reference circle of radius R is v. The time period of oscillation of the projection on a diameter of the circle is

A. $\frac{R}{v}$

B. $\frac{2\pi R}{v}$

C. $\frac{2\pi}{v}$

D. vR

Answer: B

Watch Video Solution

95. A body is oscillating vertical about its mean position. If its maximum and minimum heights above the surface of the ground are 2 m and 1.5 m, then the speed at the mean position will be $(g = 10m/s^2)$

A. $5m / s$

B. $\sqrt{2.5}m / s$

C. $10m / s$

D. $\sqrt{10}m / s$

Answer: B

Watch Video Solution

96. A body of mass 0.5 kg executes S.H.M. of frequency 4 Hz. If the amplitude of S.H.M. is 10 m, then the maximum restoring force will be

A. 0.32 N

B. $3.2 \times 10^3 N$

C. 32 N

D. 320 N

Answer: B

Watch Video Solution

97. A particle executing SHM of amplitude 4 cm and $T = 4s$ .The time taken by it to move from positive extreme position to half the amplitude is

A. 0.5 s

B. $2/3$ s

C. 0.75 s

D. 1 s

Answer: B

Watch Video Solution

98. A particle is executing S.H.M. with amplitude 'A' and maximum velocity V_m. The displacement at which its velocity is half of the maximum velocity is

A. $86.6\ \%\ A$

B. $13.4\ \%\ A$

C. $70.7\ \%\ A$

D. $36.72\ \%\ A$

Answer: A

Watch Video Solution

99. If a particle executing S.H.M. with amplitude A and maximum velocity vo, then its speed at displacement A/2 is

A. $13.4\ \%\ v_m$

B. $86.6\ \%\ v_m$

C. $37.5\ \%\ v_m$

D. $66.67\ \%\ v_m$

Answer: B

Watch Video Solution

100. The displacement of a particle excuting periodic motion is given by $y = 4\cos^2(t/2)\sin(1000t)$. Find the independent constituent SHM's.

A. 1

B. 2

C. 3

D. 4

Answer: C

Watch Video Solution

101. A body of mass 5 gm is executing S.H.M. about a point with amplitude 10 cm . Its maximum velocity is 100 cm / sec . Its velocity will be 50 cm / sec at a distance

A. 5 cm

B. $5\sqrt{3}cm$

C. $5\sqrt{2}cm$

D. $10\sqrt{2}cm$

Answer: B

Watch Video Solution

102. A particle executing simple harmonic motion has an amplitude of 6 cm . Its acceleration at a distance of 2 cm from the mean position is $8c\frac{m}{s^2}$ The maximum speed of the particle is

A. $8cm / s$

B. $12cm / s$

C. $16cm / s$

D. $24cm / s$

Answer: B

Watch Video Solution

103. A horizontal platform with an object placed on it is executing S.H.M. in the vertical direction. The amplitude of oscillation is 2.5 cm. If the object is not detached from the platform, then the least period of these oscillations will be, $(g = 10m/s^2)$

A. $0.1\pi s$

B. πs

C. $0.5\pi s$

D. $2\pi s$

Answer: A

Watch Video Solution

104. The velocity and acceleration of a particle executing S.H.M. have a steady phase relationship. The acceleration leads velocity in phase by

A. π

B. $-\pi/2$

C. $\pi/2$

D. $-\pi$

Answer: C

Watch Video Solution

105. The maximum velocity of a particle executing S.H.M. is u. If the amplitude is doubled and the time period of oscillation decreases to (1/3) of its original value, then the maximum velocity will be

A. 18 u

B. 6 u

C. 12 u

D. 3 u

Answer: B

Watch Video Solution

106. In S.H.M., the velocity of the particle at the mean position is 1 m/s and acceleration at the extremity is $2m/s^2$, the period of motion is

A. 2 s

B. 0.5 s

C. 1 s

D. 3.142 s

Answer: D

Watch Video Solution

107. A particle executes S.H.M. of period 1.2 s and amplitude 8 cm. What is the time taken to travel 2.344 cm from the positive extremity?

A. 0.17 s

B. 1 s

C. 0.15 s

D. 0.7 s

Answer: C

Watch Video Solution

108. A ball of mass 5 kg hanging from a spring oscillates with a time period of $2\pi s$. At any instant the ball is at equilibrium position, now the ball is removed, then spring shortens by

A. $2\pi m$

B. $9/2m$

C. $9.8m$

D. 2 m

Answer: C

Watch Video Solution

109. A block on a horizontal slab is moving horizontally with a simple harmonic motion of frequency two oscillations per second. If the coefficient of static friction between block and slab is 0.5, then the amplitude of the oscillation will be (if the block does not slip along the slab)

A. 3.3 cm

B. 3.5 cm

C. 3.15 cm

D. 7 cm

Answer: C

Watch Video Solution

110. The velocity of a particle performing S.H.M. at any position

A. leads in phase by $(\pi/2)$ than the displacement

B. lags in phase by $(\pi/2)$ than the displacement

C. leads in phase by $(\pi/2)$ than the acceleration

D. a' and 'b'

Answer: A

Watch Video Solution

111. The velocity at mean position and acceleration at the extreme position have the phase difference of

A. $\pi / 2$ rad

B. π rad

C. $\pi / 4$ rad

D. $3\pi / 4$ rad

Answer: A

Watch Video Solution

112. A simple pendulum performs simple harmonic motion about X = 0 with an amplitude A and period T. The speed of the pendulum at midway between mean and extreme position is

A. $\frac{\pi A\sqrt{3}}{T}$

B. $\frac{\pi A}{T}$

C. $\frac{\pi A\sqrt{3}}{2T}$

D. $\frac{3\pi^2 A}{T}$

Answer: A

Watch Video Solution

113. A body is executing simple harmonic motion with an angular frequency s rad/2 . The velocity of the body at 20 mm displacement, when the amplitude of motion is 60 mm , is

A. 40 mm/s

B. 60 mm/s

C. 113 mm/s

D. 120 mm/s

Answer: C

Watch Video Solution

114. A particle executes S.H.M. with a period of 6 second and amplitude of 3 cm . Its maximum speed in cm / sec is

A. $\pi / 2$

B. π

C. 2π

D. 3π

Answer: B

Watch Video Solution

115. The maximum speed of a particle executing S.H.M. is 1 m/s and its maximum acceleration is $1.57m/\sec^2$. The time period of the particle will be

A. $1/1.57s$

B. $1.57s$

C. 2 s

D. 4 s

Answer: D

Watch Video Solution

116. A particle executes SHM of period 12 seconds and amplitude 8 cm. Find time it takes to travel 3 cm from the positive extremity of its oscillation.

A. 1.7 s

B. 0.27 s

C. 0.2 s

D. 2.7 s

Answer: C

Watch Video Solution

117. A particle is executing SHM. Then the graph of acceleration as a function of displacement is

A. a straight line

B. a circle

C. an ellipse

D. sinusoidal

Answer: D

Watch Video Solution

118. The motion of a particle varies with time according to the relation $y = a(\sin \omega t + \cos \omega t)$,then

A. the motion is oscillatory but not S.H.M.

B. the motion is S.M.H. with amplitude A

C. the motion is S.M.H. with amplitude $A\sqrt{2}$

D. the motion is S.M.H. with amplitude 2 A

Answer: C

Watch Video Solution

Watch Video Solution

119. 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. $2\pi s$

B. $\pi / 2s$

C. πs

D. $3\pi / 2s$

Answer: C

Watch Video Solution

120. The height of a swing changes during its motion from 0.1 m to 2.5 m . The minimum velocity of a boy who swings in this swing is

A. 5.4 m/s

B. 4.95 m/s

C. 3.14 m/s

D. zero

Answer: D

Watch Video Solution

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

A. 35 Hz, 66 m/s

B. 45 Hz, 66 m/s

C. 58 Hz, 113 m/s

D. 35 Hz, 132 m/s

Answer: A

Watch Video Solution

122. A particle moves according to equation x = A cos πt. The distance covered by it in 3.5 s is

A. $3A$

B. $7A$

C. A

D. zero

Answer: B

Watch Video Solution

123. The equation of S.H.M. of a particle is $a + 4\pi^2 x = 0$, where a is instantaneous linear acceleration at displacement x. Then the frequency of motion is

A. 1 Hz

B. $4\pi Hz$

C. $1/4Hz$

D. 4 Hz

Answer: A

Watch Video Solution

124. The velocity of a particle performing S.H.M. are 0.13 m/s and 0.12 m/s. When it is at 0.12 m and 0.13 m from the mean position respectively. Then the amplitude is

A. 0.117 m

B. 0.177 m

C. 11.7 m

D. 10 m

Answer: B

Watch Video Solution

125. The ratio of instantaneous speed at centre to average speed of a particle performing S.H.M. is

A. 2π

B. $2/\pi$

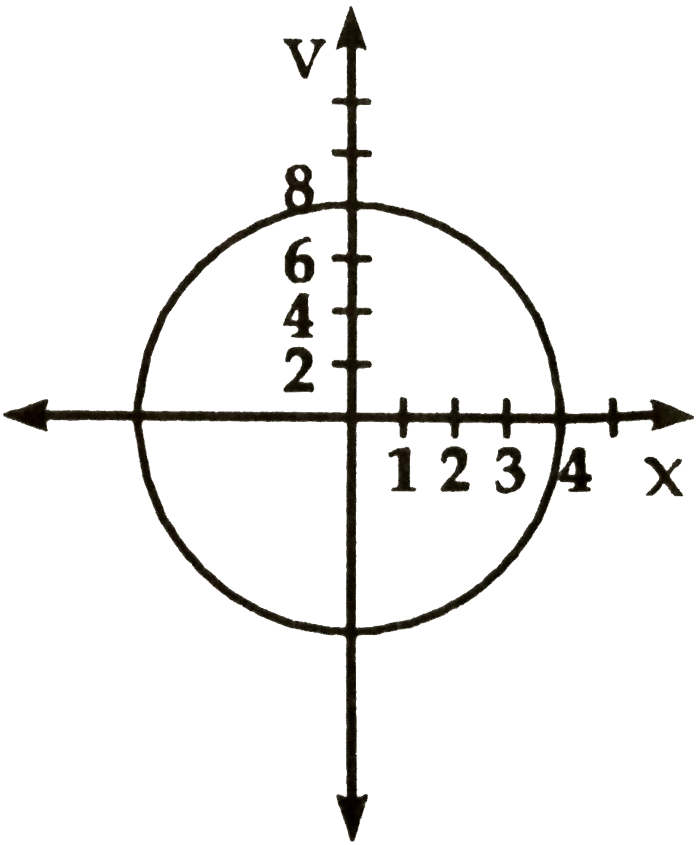
C. $\frac{\pi}{2}$

D. $\frac{\pi}{2}\sqrt{1-\frac{x^2}{A^2}}$

Answer: C

Watch Video Solution

126. A graph is plotted between the instantaneous velocity of a particle performing S.H.M. and displacement. Then the period of S.H.M. is



A. 2 s

B. πs

C. $\frac{1}{\pi}s$

D. $0.5s$

Answer: B

Watch Video Solution

127. The ratio of instantaneous velocity and the average speed of the particle performing S.H.M. is

A. 2π

B. $\frac{2}{\pi}$

C. $\frac{\pi}{2}$

D. $\frac{\pi}{2}\sqrt{1-\frac{x^2}{A^2}}$

Answer: D

Watch Video Solution

128. The velocities of a body executing S.H.M. are 3 cm/s and 4 cm/s when the displacements from the mean position are 4 cm and 3 cm, then the period of oscillation is

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

B. $\frac{x}{2}s$

C. $\frac{2}{x}s$

D. $2\pi s$

Answer: D

Watch Video Solution

129. The acceleration of a particle executing SHM at a distance of 3 cm from equilibrium position is $5cm/s^2$. Its acceleration at a distance of 2 cm from equilibrium position is

A. $10/3cm/s^2$

B. $10cm/s^2$

C. $7.5cm/s^2$

D. $4.5cm/s^2$

Answer: A

Watch Video Solution

130. A particle of mass 0.25 kg vibrates with a period of 2 s. It its greatest displacement is 0.4 m, its maximum velocity in m/s will be

A. $\pi/5$

B. $\pi/10$

C. $2\pi/5$

D. $\pi/2$

Answer: C

Watch Video Solution

131. A particle executing SHM has a frequency of 10 Hz when it crosses its equilibrium position with a velocity of $2\pi m/s$. Then the amplitude of vibration is

A. 0.1 m

B. 0.2 m

C. 0.4 m

D. 1 m

Answer: A

Watch Video Solution

132. A particle describes SHM along a straight line with a period of 2 s and amplitude 10 cm. Its velocity when it is at a distance of 6 cm from mean position is

A. $2\pi cm / s$

B. $4\pi cm / s$

C. $6\pi cm / s$

D. $8\pi cm / s$

Answer: D

Watch Video Solution

133. The period of a simple harmonic oscillator is 2 s. If it crosses mean position at an instant. The time after which its displacement from the mean position will be half of the amplitude is.

A. $(1/8)s$

B. $(1/6)s$

C. $(1/4)s$

D. $(1/2)s$

Answer: B

Watch Video Solution

134. A simple harmonic oscillator has amplitude 2 A and maximum velocity 2 V. Then its displacement at which its velocity is V and the velocity at displacement A are

A. A, V

B. $\frac{A}{2}, \frac{v}{2}$

C. $\frac{A}{\sqrt{2}}, \frac{v}{\sqrt{2}}$

D. $\sqrt{3}A, \sqrt{3}V$

Answer: D

Watch Video Solution

135. Velocity of a simple harmonic oscillator in the mean position is v_0. If its amplitude is doubled, without changing its period of oscillation, its velocity in the mean position will be

A. $v_0 / (2)$

B. $2v_0$

C. v_0

D. $v_0 / 4$

Answer: B

Watch Video Solution

136. A body executing S.H.M. has a period of 3 s under one force and 4 s under another force. Then time period under the action of both the forces together in the same direction is

A. 1.2 s

B. 2.4 s

C. 3.6 s

D. 4.8 s

Answer: B

Watch Video Solution

137. A simple harmonic oscillator has its displacement varying as x = 15 sin $(2\pi t + \pi / 4)$ metre. Then its initial displacement is

A. 15 m

B. $15/\sqrt{2}m$

C. $15\sqrt{2}m$

D. $7.5m$

Answer: B

Watch Video Solution

138. A particle executes S.H.M., according to the displacement equation x = 6 sin $(3\pi t + \pi/6)$m. Then the magnitude of its acceleration at t = 2 s is

A. $3\pi^2 m / s^2$

B. $9\pi^2 m / s^2$

C. $18\pi^2 m / s^2$

D. $27\pi^2 m / s^2$

Answer: D

Watch Video Solution

139. The displacement equation of a particle performing S.H.M. is x = 10 sin $\left(2\pi t + \frac{\pi}{6}\right)$m. Then the initial displacement of a particle is

A. 5 m

B. 2.5 m

C. 0.5 m

D. 0.25 m

Answer: A

Watch Video Solution

140. If the displacement of a particle executing S.H.M. is given by x = 0.24 sin (400 t + 0.5)m, then the maximum velocity of the particle is

A. $24m/s$

B. $48m/s$

C. $96m/s$

D. $72m/s$

Answer: C

Watch Video Solution

141. Two simple harmonic motions are given by $y_1 = a\sin\left[\left(\frac{\pi}{2}\right)t + \phi\right]$ and

$y_2 = b\sin\left[\left(\frac{2\pi}{3}\right)t + \phi\right]$. The phase difference between these after $1s$ is

A. π

B. $\pi/2$

C. $\pi/4$

D. $\pi/6$

Answer: D

Watch Video Solution

142. The displacement of a simple harmonic oscillator is, x = 5 sin $(\pi t / 3)m$. Then its velocity at t = 1 s, is

A. $\frac{\pi}{6}m/s$

B. $\frac{5\pi}{6}m/s$

C. $\frac{6\pi}{6}m/s$

D. $\frac{\pi}{2}m/s$

Answer: B

Watch Video Solution

143. A particle oscillates, according to the equation $x = 5 \cos(\pi t / 2)$ m. Then the particle moves from equilibrium position to the position of maximum displacement in time of

A. 1 s

B. 2 s

C. $1/2$ s

D. 4 s

Answer: A

Watch Video Solution

144. A particle executing S.H.M. is given by $x = 10\sin(8t + \pi/3)m.$

Its velocity when it is at a distance 6 m from the mean position is,

A. 36 m/s

B. 10 m/s

C. 80 m/s

D. 64 m/s

Answer: D

Watch Video Solution

145. The displacement equation of an oscillator is given by x = 5 sin $(2\pi t + 0.5\pi)m.$ Then its time period and initial displacement are

A. 0.5 s, 5 m

B. 1 s, 2.5 m

C. 0.5 s, 2.5 m

D. 1 s, 5 m

Answer: D

Watch Video Solution

146. The acceleration of a simple harmonic oscillator is $1m/s^2$ when its displacement from mean position is 0.5 m. Then its frequency of oscillation is

A. $\sqrt{2}\pi Hz$

B. $\pi/\sqrt{2}Hz$

C. $\frac{1}{\sqrt{2}\pi}Hz$

D. $\frac{\sqrt{2}}{\pi}Hz$

Answer: C

Watch Video Solution

147. The displacement of a simple harmonic oscillator is given by x = 4 cos $(2\pi t + \pi / 4)m.$ Then velocity of the oscillator at t = 2 s is

A. $4\pi\sqrt{2}m / s$

B. $\frac{4\pi}{\sqrt{2}}m / s$

C. $\frac{\sqrt{2}\pi}{4}m / s$

D. $\frac{4\sqrt{2}}{\pi}m / s$

Answer: A

Watch Video Solution

148. A particle executes SHM along a straight line so that its period is 12 s. The time it takes in traversing a distance equal to half its amplitude from its equilibrium position is

A. 0.1 s

B. 1 s

C. 0.01 s

D. 1.1 s

Answer: B

Watch Video Solution

149. Two bodies of equal mass are hung from two light vertical springs. The springs are elongated by 1 cm and 4 cm. If they are made to oscillate, the ratio of time periods is

A. $1:1$

B. $1:2$

C. $2:1$

D. $1:4$

Answer: B

Watch Video Solution

150. Starting from the origin a body osillates simple harmonicall with a period of 2 s. A fter what time will its kinetic energy be 75% of the total energy?

A. $\frac{1}{3}s$

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

C. $\frac{1}{6}s$

D. $\frac{1}{12}s$

Answer: C

Watch Video Solution

151. A particle of mass 0.3 kg subject to a force $F = -kx$ with $k = 15N/m$. What will be its initial acceleration if it is released from a point 20cm away from the origin?

A. $3m/s^2$

B. $5m/s^2$

C. $10m/s^2$

D. $15m/s^2$

Answer: C

Watch Video Solution

152. The displacement of a SHO is given by y = 2 sin $(2\pi t + \pi / 4)m.$ The ratio of its initial displacement to maximum displacement is

A. $1 / \sqrt{2}$

B. $\sqrt{2} / 1$

C. 2

D. zero

Answer: A

Watch Video Solution

153. A particle is executing SHM with an amplitude of 2 m. The difference in the magnitudes of its maximum acceleration and maximum velocity is 4. The time period of its oscillation is

A. 2 s

B. $(7/22)s$

C. $\left(\frac{22}{7}\right)s$

D. $\left(\frac{44}{7}\right)s$

Answer: C

Watch Video Solution

154. The maximum velocity and maximum acceleration of a particle executing SHM are 20 cm s^{-1} and $100 cm s^{-2}$. The displacement of the particle from the mean position when its speed is 10 cm s^{-1} is

A. 2 cm

B. 2.5 cm

C. $2\sqrt{3} cm$

D. $2\sqrt{2} cm$

Answer: C

Watch Video Solution

155. A particle is executing SHM with and frequency of $\frac{1}{8}$ Hz. If it starts from the mean position at time t = 0, the ratio of distances convered by it in 1st and 2nd seconds is

A. 1

B. $1/\left(\sqrt{2}-1\right)$

C. $1/\left(\sqrt{3}-1\right)$

D. $\sqrt{2}-1$

Answer: B

Watch Video Solution

156. A particle executes SHM with a time period of 8 s. It is starts from the extreme position at time t = 0, the ratio of distances covered by it in 1st and 2nd seconds is

A. 1

B. $1/\left(\sqrt{2}-1\right)$

C. $1/\left(\sqrt{3}-1\right)$

D. $\sqrt{2}-1$

Answer: B

Watch Video Solution

157. If the maximum speed of a SHO is πms^{-1}. Its average speed during one oscillations is

A. $\frac{\pi}{2}ms^{-1}$

B. $\frac{\pi}{4}ms^{-1}$

C. πms^{-1}

D. $2ms^{-1}$

Answer: D

Watch Video Solution

158. A particle executing SHM passes through the mean position with a velocity of $4ms^{-1}$. The velocity of the particle at a point where the displacement is half of the amplitude is

A. $2ms^{-1}$

B. $2\sqrt{3}ms^{-1}$

C. $\sqrt{3}ms^{-1}$

D. $1ms^{-1}$

Answer: B

Watch Video Solution

159. The restoring force acting on a particle executing SHM is 10 N at a displacement of 2 cm from mean position. The restoring force at a displacement of 3 cm is

A. 20 N

B. 15 N

C. $\frac{20}{3}N$

D. $\frac{40}{9}N$

Answer: B

Watch Video Solution

160. The displacement of a SHO is given by,

$y = 0.4\sin(10\pi t + \pi/3)\cos(10\pi t + \pi/3)$

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

A. $10\pi s$

B. $\frac{1}{10\pi}s$

C. $20\pi s$

D. $\frac{1}{20\pi}s$

Answer: D

Watch Video Solution

161. A particle executes SHM along x-axis with an amplitude A, time period T with origin as the mean position. At t = 0, if the particle starts in the +ve x-direction from the origin the minimum time in which it will be at $x = -A/2$ will be

A. $\frac{T}{12}$

B. $\frac{T}{6}$

C. $\frac{T}{4}$

D. $\frac{7T}{12}$

Answer: D

Watch Video Solution

Watch Video Solution

162. If the displacement (y in m) and velocity (v in ms^{-1}) of a particle executing SHM are related by the equation $4v^2 = 16 - y^2$, then the path length of the motion and time period of oscillation respectively are

A. $4m, 2\pi s$

B. $4m, 4\pi s$

C. $8m, 2\pi s$

D. $8m, 4\pi s$

Answer: D

Watch Video Solution

163. An object is attched to the bottom of a light vertical spring and set vibrating. The maximum speed of the object is $15cm/s$ and the period is 628 milli seconds. The amplitude of the motion in centimetres is

A. 3.0

B. 2.0

C. 1.5

D. 1.0

Answer: C

Watch Video Solution

164. Two particles A and B execute SHM on a straight line of path length 2 m starting from the two extreme points simultaneously. If their respective time periods are 1 s and 2 s, the minimum time in which they meet is

A. $\frac{1}{4}s$

B. $\frac{1}{3}s$

C. $\frac{1}{2}s$

D. $\frac{2}{5}s$

Answer: B

Watch Video Solution

165. A particles executes SHM according to the equation y = 2 sin $2\pi t$, where y is displacement in m and t is time in s. The distance covered by the particle in 4 s of its motion is

A. 0

B. 2 m

C. 8 m

D. 32 m

Answer: D

Watch Video Solution

166. The ratio of the magnitude of maximum velocity to the maximum acceleration of a particle making SHM is 1 : 1. The time taken by the particle to move between the extreme points of its path is

A. 1.57 s

B. 3.14 s

C. 6.28 s

D. 1 s

Answer: B

Watch Video Solution

167. The maximum velocity of a particle executing SHM is v. If its amplitude of oscillation is doubled and its time period is made half of its initial value, the maximum velocity of it will be

A. v

B. 2 v

C. 4 v

D. 8 v

Answer: C

Watch Video Solution

168. Two simple harmonic oscillators of masses m, 4m have same energy. If their amplitudes are in the ratio 1 : 2, the ratio of their periods is

A. $1:2$

B. $1:4$

C. $1:1$

D. $2:1$

Answer: B

Watch Video Solution

169. A particle executing SHM has a velocity of 2 ms^{-1} when its displacement from mean position is 1 cm and a velocity of $1ms^{-1}$ when its displacement is 2 cm. Its amplitude of oscillationis

A. 5 cm

B. $\sqrt{5}cm$

C. 3 cm

D. $\sqrt{7}cm$

Answer: B

Watch Video Solution

170. The phase of a particle executing simple harmonic motion is $\frac{\pi}{2}$ when it has

A. maximum velocity

B. minimum acceleration

C. maximum kinetic energy

D. maximum displacement

Answer: D

Watch Video Solution

171. The amplitude of particle performing S.H.M. is

A. tensor

B. vector

C. scalar

D. depending upon magnitude

Answer: B

Watch Video Solution

172. The phase quantity depends upon

A. time and displacement

B. time, direction and displacement

C. displacement and direction

D. displacement

Answer: B

Watch Video Solution

173. The particle performing S.H.M. with epoch α displacement of motion is x = A $\sin \omega t + \alpha$.

The term $(\omega t + \alpha)$ is known as

A. initial phase angle of motion

B. instantaneous phase of S.H.M.

C. total phase of S.H.M.

D. none of these

Answer: C

Watch Video Solution

174. In S.H.M.,

A. epoch and phase continuously changes with time

B. epoch and phase remains constant at all times

C. epoch remains constant while phase changes continuously with time

D. phase remains constant while epoch change continuously with time

Answer: C

Watch Video Solution

175. The phase of a particle performing S.H.M. when the particle is at a distance of amplitude from mean position is

A. $\pi / 2$

B. π

C. $3\pi/2$

D. odd multiple of $\pi/2$

Answer: D

Watch Video Solution

176. The period of a body performing S.H.M. of frequency 5 Hz is

A. $(2\pi/5)s$

B. $(5\pi)s$

C. $(\pi/5)s$

D. $(0.2)s$

Answer: D

Watch Video Solution

177. A particle executing S.H.M. starts from midway between mean and extreme position, the phase is

A. $\frac{\pi}{3}$ rad

B. $\frac{\pi}{2}$ rad

C. $\frac{\pi}{6}$ rad

D. π rad

Answer: C

Watch Video Solution

178. The displacement of a particle performing S.H.M is $x = A \quad \sin(\omega t + \propto)$. The quantity $\propto$ is called

A. phase constant

B. epoch

C. initial phase

D. all of the above

Answer: D

Watch Video Solution

179. The vertical extension in a light spring by a weight of 1 kg suspended from the wire is 9.8 cm . The period of oscillation

A. $20\pi s$

B. $2\pi s$

C. $2\pi / 10s$

D. $200\pi s$

Answer: C

Watch Video Solution

180. A small spherical steel ball is placed a little away from the centre of a large concave mirror of radius of curvature 2.5 m, if the ball is released, then the period of the motion will be $(g = 10m / s^2)$

A. $\pi / 4s$

B. $\pi / 2s$

C. π / s

D. $2\pi s$

Answer: C

Watch Video Solution

181. In S.H.M., the phase difference between the displacement and velocity of a particle, at any isntant is

A. π

B. 2π

C. $\pi / 2$

D. 0

Answer: C

Watch Video Solution

182. Two particles executes S.H.M. of the same amplitude and frequency along the same straight line. They pass one another when going in opposite directions, each time their displacement is root three by two times amplitude. The phase difference between them is

A. $\frac{2\pi}{3}$ rad

B. $\frac{\pi}{2}$ rad

C. $\frac{\pi}{6}$ rad

D. $\frac{\pi}{3}$ rad

Answer: D

Watch Video Solution

183. Two particles starts vibrating together in S.H.M. starting from their mean position. If their periods are 40 s and 60 s respectively, their phase difference after 20 s from the start will be

A. 60°

B. 90°

C. 30°

D. 120°

Answer: A

Watch Video Solution

184. Two particles P and Q performs S.H.M. of same amplitude 'A' and frequency n along the same straight line the resultant S.H.M. have the amplitude $\sqrt{2}$ times amplitude of individual. The initial phase difference between two particles will be nearly.

A. zero

B. $\frac{\pi}{6}$ rad

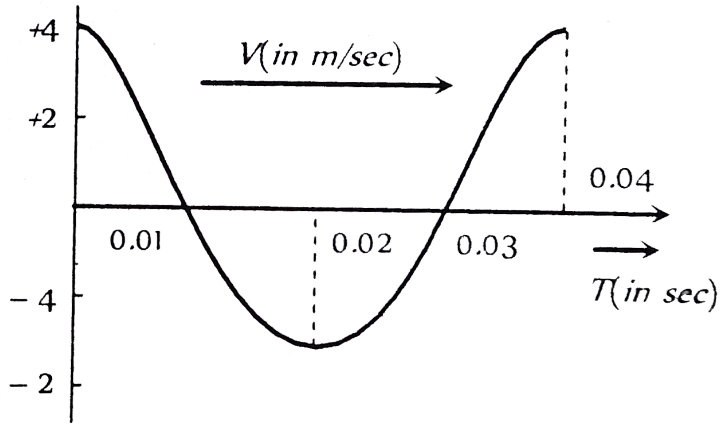
C. $\frac{\pi}{2}$ rad

D. $\frac{3\pi}{4}$ rad

Answer: C

Watch Video Solution

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



A. 25 Hz

B. 12.25 Hz

C. 50 Hz

D. 33.3 Hz

Answer: A

Watch Video Solution

186. The epoch of a simple harmonic motion represented by $x = \sqrt{3} \sin \omega t + \cos \omega t m$ is

A. 30°

B. 40.3°

C. 60°

D. 25°

Answer: A

Watch Video Solution

187. If the mass of an osicllator is numerically equal to its force constant, then the frequency of oscillation will be

A. π

B. 2π

C. $1/\pi$

D. $1/2\pi$

Answer: D

Watch Video Solution

Watch Video Solution

188. If a particle performing S.H.M. from the mean position of amplitude 'A' and period 'T', then the lapse of fraction of period in $(7/8)^{th}$ oscillation will be

A. $\frac{T}{12}$

B. $\frac{T}{6}$

C. $\frac{11}{12}T$

D. $\frac{7}{8}T$

Answer: C

Watch Video Solution

189. Two particles are executing S.H.M. according to the equations

$x_1 = 6\sin(10\pi t + \pi/3)$ and $x_2 = 5\cos(8\pi t + \pi/4)$

Then the phase difference between the first and second particle at t = 0.5 s will be

A. $\frac{7\pi}{12}$

B. $\frac{13\pi}{12}$

C. $\frac{25\pi}{12}$

D. $\frac{\pi}{12}$

Answer: A

Watch Video Solution

190. Two particles are executing S.H.M. according to the equations

$x_1 = 6\sin(10\pi t + \pi/3)$ and $x_2 = 6\cos(8\pi t + \pi/4)$

Then the phase difference between the first and second particle at t = 0.5 s will be

A. $\frac{7\pi}{12}$

B. $\frac{13\pi}{12}$

C. $\frac{25\pi}{12}$

D. $\frac{\pi}{12}$

Answer: B

Watch Video Solution

191. A body moves between two points A and B which are at a distance a and b from the point O in the same straight line OAB. Then the amplitude of oscillation is

A. $\frac{a+b}{2}$

B. $\sqrt{\frac{a^2+b^2}{2}}$

C. $\frac{b-a}{2}$

D. b-a

Answer: C

Watch Video Solution

192. If α and β denote the maximum velocity and maximum acceleration of a simple harmonic oscillator, then its amplitude of vibration is

A. $\alpha^2\beta$

B. $\beta^2\alpha$

C. a^2 / β

D. β^2 / α

Answer: C

Watch Video Solution

193. Two particles execute SHM of the same time period along the same straight lines. They cross each other at the mean position while going in opposite directions. Their phase difference is

A. $\pi / 2$

B. π

C. $3\pi/2$

D. 2π

Answer: B

Watch Video Solution

194. The displacement of a particle making S.H.M. is given by $x = 6\cos\left(100t + \frac{\pi}{4}\right)m$ then the frequency is

A. $1.592Hz$

B. $15.92Hz$

C. $159.2Hz$

D. $1592Hz$

Answer: B

Watch Video Solution

195. The equation of S.H.M. with amplitude 4m and time period 1/2 s with initial phase $\pi/3$ is x =

A. $4\sin(2\pi t + \pi/3)m$

B. $4\sin(4\pi t + \pi/3)m$

C. $4\sin(\pi t + \pi/3)m$

D. $4\sin(2\pi t + \pi/6)m$

Answer: B

Watch Video Solution

196. Two $SHM's$ are represented by $y = a\sin(\omega t - kx)$ and $y = b\cos(\omega t - kx)$. The phase difference between the two is :

A. $\pi/2$

B. $\pi/4$

C. $\pi/6$

D. $3\pi/4$

Answer: A

Watch Video Solution

197. The kinetic energy of a particle performing S.H.M. at mean position is

A. minimum

B. maximum

C. constant

D. $1/2m\omega^2x^2$

Answer: B

Watch Video Solution

198. The kinetic energy of a particle performing S.H.M. at extreme position is

A. minimum or zero

B. maximum

C. constant

D. $1/2m\omega^2x^2$

Answer: A

Watch Video Solution

199. The potential energy of a particle performing S.H.M. at extreme position is

A. minimum

B. maximum

C. remains constant

D. $1/2m\omega^2x^2$

Answer: B

Watch Video Solution

200. The potential energy of a particle performing S.H.M. at mean position is

A. minimum

B. in between minimum and maximum

C. maximum

D. $1/2m\omega^2x^2$

Answer: A

Watch Video Solution

201. The graph between kinetic energy and displacement of a particle performing S.H.M. is

A. parabola

B. straight line

C. ellipse

D. circle

Answer: A

Watch Video Solution

202. The graph between potential energy and displacement of a particle performing S.H.M. is

A. parabola

B. straight line

C. ellipse

D. circle

Answer: A

Watch Video Solution

203. The graph between total energy and displacement of a particle performing S.H.M. is

A. parabola

B. straight line

C. ellipse

D. circle

Answer: B

Watch Video Solution

204. The graph energy of a particle performing S.H.M. is proportional to the

A. square of frequency

B. square of mass

C. square of amplitude

D. both 'a' and 'c'

Answer: D

Watch Video Solution

205. The potential energy of a particle performing S.H.M. at mean position is

A. $\frac{1}{2}m\omega^2 A^2$

B. 0

C. $\frac{1}{2}m\omega^2 x^2$

D. $\frac{1}{2}m\omega^2\left(A^2 - x^2\right)$

Answer: B

Watch Video Solution

206. A particle executes SHM with a time period T. The time period with which its potential energy retains the same value

A. T

B. 2T

C. $T/2$

D. ∞

Answer: C

Watch Video Solution

207. If a particle executes an undamped S.H.M. of period of T, then the period with which the kinetic energy fluctuate is

A. T

B. 2T

C. T/2

D. ∞

Answer: C

Watch Video Solution

208. If a particle executes an undamped S.H.M. of period T, then the period with which the total energy fluctuate is

A. T

B. 2T

C. $T/2$

D. ∞

Answer: D

Watch Video Solution

209. The particle performing S.H.M. along a straight line about the mean position with an amplitude 'A'. Then the maximum potential energy at a distance A from the extreme position is

A. A

B. 0

C. $A/2$

D. $(3/2)A$

Answer: B

Watch Video Solution

210. When a particle oscillates simple harmonically, its kinetic energy varies periodically. If frequency of the particle is n, the frequency of the kinetic energy is

A. 4 n

B. n

C. 2 n

D. $n/2$

Answer: C

Watch Video Solution

211. When a particle oscillates simple harmonically, its potential energy varies periodically. If the frequency of oscillation of the particle is n, the frequency of potential energy variation is

A. 4 n

B. n

C. 2 n

D. $n/2$

Answer: C

Watch Video Solution

212. For a particle executing $S. H. M.$, the kinetic energy K is given $K = K_0 \cos^2 \omega t$. The maximum value of potential energy is:

A. K_0

B. $K_0 / 2$

C. zero

D. not obtained

Answer: A

Watch Video Solution

213. The potential energy of a particle with displacement X is $U(X)$. The motion is simple harmonic, when (K is a positive constant)

A. $u = \frac{-kx^2}{2}$

B. $u = \frac{1}{2}kx^2$

C. $u = k$

D. $u = kx$

Answer: B

Watch Video Solution

214. Kinetic energy of the particle performing S.H.M. is

A. harmonic motion and oscillatory

B. periodic motion but not oscillatory

C. oscillatory motion but not periodic

D. periodic and oscillatory motion

Answer: B

Watch Video Solution

215. Potential energy of the particle performing S.H.M. is

A. harmonic motion and oscillatory

B. periodic motion but not oscillatory

C. oscillatory motion but not periodic

D. periodic and oscillatory motion

Answer: B

View Text Solution

216. Kinetic energy of a particle performing S.H.M.

A. leads the potential energy by a phase of π

B. leads the potential energy by a phase of $\pi / 2$

C. lags the potential energy by a phase of $\pi / 2$

D. lags the potential energy by a phase of π

Answer: B

Watch Video Solution

217. In a period of kinetic energy, the number of times kinetic energy and potential energy are equal in magnitude is

A. single times

B. thrice

C. twice

D. four times

Answer: C

Watch Video Solution

218. In a period of oscillating particle, the number of times kinetic energy and potential energy are equal in magnitude is

A. single

B. thrice

C. twice

D. four times

Answer: D

Watch Video Solution

219. The total energy of a particle executing SHM is E. Its kinetic energy is K at the mean position. Then always

A. $E - K = 0$

B. $E - K < 0$

C. $E - K > 0$

D. $E - K \geq 0$

Answer: D

Watch Video Solution

220. A particle of mass m executes SHM with amplitude A and frequency n. The average energy in one time period is

A. $\pi^2 mn^2 A^2$

B. $2\pi^2 mn^2 A^2$

C. $\pi^2 m^2 n^2 A^2$

D. $2\pi mn^2 A^2$

Answer: B

Watch Video Solution

221. A particle of mass m executes simple harmonic motion with amplitude a and frequency v. The average kinetic energy during its motion from the position of equilinrium to the end is.

A. $\pi^2 mn^2 A^2$

B. $2\pi^2 mn^2 A^2$

C. $\frac{\pi^2 mn^2 A^2}{2}$

D. zero

Answer: A

Watch Video Solution

222. A particle executing S.H.M. has total energy of 20 J. If the potential energy of the particle midway between mean and extreme position is 5 J, then the average potential energy will be

A. 10 J

B. 5 J

C. 15 J

D. 7.5 J

Answer: A

Watch Video Solution

223. A particle executing S.H.M. has total energy of 20 J. If the potential energy of the particle midway between mean and extreme position is 5 J, then the average potential energy will be

Watch Video Solution

224. A particle executing S.H.M. has total energy of 20 J. If the potential energy of the particle midway between mean and extreme position is 5 J, then the average total energy will be

A. 10 J

B. 20 J

C. 15 J

D. 7.5 J

Answer: B

View Text Solution

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

A. square of amplitude

B. square root of angular velocity

C. amplitude

D. angular velocity

Answer: A

Watch Video Solution

226. In S.H.M. the displacement of a particle is half of the amplitude, the share of the potential energy and kinetic energy are

A. 50% and 50% respectively

B. 59% and $41\% 1$ respectively

C. 25% and 75% respectively

D. 33% and 66% respectively

Answer: C

Watch Video Solution

227. The ratio of potential energy to kinetic energy of a particle performing S.H.M. at midway between mean and extreme position is

A. $3:1$

B. $1:3$

C. $6 : 9$

D. $4 : 3$

Answer: B

Watch Video Solution

228. A particle of mass 100 g is executing S.H.M. with amplitude of 10 cm. When the particle passes through the mean position at t = 0. Its kinetic energy is 8 mJ. The equation of simple harmonic motion, if initial phase is zero is

A. $x = 0.1 \sin 4t$

B. $x = 0.1 \cos 4t$

C. $x = 0.1 \sin 2t$

D. $x = 0.1 \cos 2t$

Answer: A

Watch Video Solution

229. A particle is vibrating in a simple harmonic motion with an amplitude of 4 cm . At what displacement from the equilibrium position, is its energy half potential and half kinetic

A. 1 cm

B. $\sqrt{2}cm$

C. 3 cm

D. $2\sqrt{2}cm$

Answer: D

Watch Video Solution

230. A particle is performing linear S.H.M. at a point A, on the path, its potential energy is three times kinetic energy. At another point B on the same path, its kinetic energy is 3 times the potential energy. The ratio of the potential energy at A to its potential energy at B is

A. $9:1$

B. $1:9$

C. $1:3$

D. $3:1$

Answer: D

Watch Video Solution

231. A particle is performing linear S.H.M. at a point A, on the path, its potential energy is three times kinetic energy. At another point B on the same path, its kinetic energy is 3 times the potential energy. The ratio of the kinetic energy at A to its kinetic at B is

A. $9:1$

B. $1:9$

C. $1:3$

D. $3:1$

Answer: C

Watch Video Solution

232. A body of mass 25 gm performs linear S.H.M. The force constant of the motion is 400 dyne/cm. When the body is at a distance of 10 cm from the equilibrium position has velocity of 40 cm/s, then the total energy of the body will be

A. $40 \times 10^4 J$

B. $4 \times 10^4 erg$

C. $2 \times 10^4 erg$

D. $2 \times 10^5 J$

Answer: B

Watch Video Solution

233. A particle is executing linear simple harmonic motion of amplitude 'A'. The fraction of the total energy is the kinetic when the displacement is half of the amplitude is

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

B. $\frac{1}{2\sqrt{2}}$

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

D. $\frac{3}{4}$

Answer: D

Watch Video Solution

234. 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. $\pi / 5s$

B. $2\pi s$

C. $20\pi s$

D. $5\pi s$

Answer: A

Watch Video Solution

235. Ratio of kinetic energy to potential energy of an oscillator when it is at distance $1/N$ times of amplitude from mean positions in

A. n^2

B. $n^2 + 1$

C. $1/n^2$

D. $n^2 - 1$

Answer: D

Watch Video Solution

236. An object of mass $0.2kg$ executes simple harmonic oscillation along the $x - a\xi s$with a frequency of $(25/\pi)Hz$. At the position $x = 0.04$, the object has Kinetic energy of $0.5J$ and potential energy `0.4 J. The amplitude of oscillations is......m.

A. 4 cm

B. 8 cm

C. 2 cm

D. 6 cm

Answer: D

Watch Video Solution

237. The kinetic energy and potential energy of a particle executing simple harmonic motion will be equal, when displacement (amplitude $= a$) is

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

B. $A\sqrt{2}$

C. $\frac{A}{\sqrt{2}}$

D. $\frac{A\sqrt{2}}{3}$

Answer: C

Watch Video Solution

238. The potential energy of a particle executing S.H.M. is 2.5 J, when its displacement is half of amplitude. The total energy of the particle will be

A. 7.5 J

B. 10 J

C. 5 J

D. 2.5 J

Answer: B

Watch Video Solution

239. A particle of mass 0.5 kg executes SHM. If its period of oscillation is π seconds and total energy is 0.04 J, then the amplitude of oscillation will be

A. 40 cm

B. 20 cm

C. 15 cm

D. 10 cm

Answer: B

Watch Video Solution

240. The total mechanical energy of a particle performing S.H.M. is 150 J with amplitude 1 m and force constant 200 N/m. Then minimum P.E. is,

A. 50 J

B. 100 J

C. 150 J

D. zero

Answer: A

Watch Video Solution

241. The total energy of simple harmonic oscillator is E and amplitude is 'A'. It the kinetic energy is 3E/4 without altering the amplitude. The displacement of the oscillator is

A. $A/2$

B. $3A/4$

C. $2A$

D. $4A$

Answer: A

Watch Video Solution

242. The potential energy of a particle performing S.H.M. in its rest position is 15 J. If the average kinetic energy is 5 J, then the total energy of the particle performing S.H.M. will be

A. 5 J

B. 10 J

C. 20 J

D. 15 J

Answer: B

Watch Video Solution

243. A particle of mass 1 kg is moving in SHM with an amplitude 0.02 m and a frequency of 60 Hz. The maximum force (in N) acting on the particle is

A. $2.88\pi^2 N$

B. $28.8\pi^2 N$

C. $288\pi^2 N$

D. $2880\pi^2 N$

Answer: C

Watch Video Solution

244. An oscillating mass spring system has mechanical energy 1 joule, when it has an amplitude $0.1m$ and maximum speed of $1ms^{-1}$. The force constant of the spring is (in Nm^{-1})

A. $100N/m$

B. $200N/m$

C. $300N/m$

D. $50N/m$

Answer: B

Watch Video Solution

245. The K.E. of a particle in S.H.M. 0.2 s after passing the mean position is half of its total energy. Then its period of oscillationis

A. 0.8 s

B. 1.6 s

C. 0.4 s

D. 1.2 s

Answer: B

Watch Video Solution

246. The PE of a simple harmonic oscillator 0.1 s after crossing the mean position is 1/4 of its total energy. Then the period of its oscillation is

A. 0.2 s

B. 0.3 s

C. 0.9 s

D. 1.2 s

Answer: D

Watch Video Solution

247. If amplitude of a particle in S.H.M. is doubled, which of the following quantities will be doubled

A. time period

B. kinetic energy

C. total energy

D. maximum velocity

Answer: D

Watch Video Solution

248. The potential energy as a function of displacement for an oscillator $u = 8x^2$ joule. The magnitude of the force on the oscillator of mass 0.5 kg placed at x = 0.2 m is

A. 1.6 N

B. 3.2 N

C. 0.8 N

D. 4.8 N

Answer: B

Watch Video Solution

249. The displacement of a particle of mass 1 kg in S.H.M. is x = 2 sin $(\pi t + \phi)$m. Then variation of its PE in joule is

A. $U = 4\pi^2 \sin^2(\pi t + \phi)$

B. $U = 2\pi^2 \sin^2(\pi t + \phi)$

C. $U = 2\pi^2 \cos^2(\pi t + \phi)$

D. $U = 4\pi^2 \cos^2(\pi t + \phi)$

Answer: B

Watch Video Solution

250. A particle of mass 1 kg executing S.H.M. is given by y = 2 cos $(10t + \pi/3)$ in SI units. Its maximum potential energy is

A. 2 J

B. 20 J

C. 200 J

D. 100 J

Answer: C

Watch Video Solution

251. If A is amplitude of a particle in SHM, its displacement from the mean position when its kinetic energy is thrice that to its potential energy

A. A

B. $A/4$

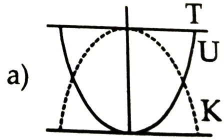
C. $A/2$

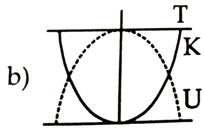
D. $3A/4$

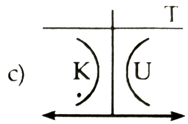
Answer: C

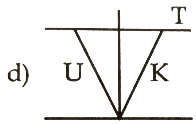
Watch Video Solution

252. For a simple harmonic oscillator moving along a straight line, the graphs which represent the variation of kinetic energy K, potential energy U and total energy T with displacement are

A. 

B. 

C. 

D. 

Answer: A

Watch Video Solution

253. A particle is executing SHM. At a displacement y_1 its potential energy is U_1 and at a displacement y_2 its potential energy is U_2. The potential energy of the particle at displacement $(y_1 + y_2)$ is

A. $U_1 + U_2$

B. $\sqrt{U_1^2 + U_2^2}$

C. $U_1 - U_2$

D. $U_1 + U_2 + 2\sqrt{U_1 U_2}$

Answer: D

Watch Video Solution

254. A particle executing SHM has a total energy E. Another particle of twice the mass of the first particle executes SHM with 4 times the frequency and twice the amplitude of the first. Its total energy is

A. $E/2$

B. 32 E

C. 64 E

D. 128 E

Answer: D

Watch Video Solution

Watch Video Solution

255. The potential energy of a particle executing SHM in its rest position is 15 J. The average kinetic energy of the particle during one oscillation is 5 J. The total energy of the particle is

A. 10 J

B. 25 J

C. 15 J

D. 5 J

Answer: C

View Text Solution

256. The displacement of a particle of mass 100 g executing SHm is given by the equation y = 0.2 cos $\left(100t + \frac{\pi}{4}\right)$ meter. Its total energy is

A. 1 J

B. 10 J

C. 2 J

D. 20 J

Answer: D

Watch Video Solution

257. The equation of the displacement of two particles making SHM are represented by $y_1 = a\sin(\omega t + \phi) \& y_2 = a\cos(\omega t)$. Phase difference between velocities of two particles is

A. $(\pi + \phi)$

B. $(\phi - \pi/2)$

C. ϕ^2

D. $(\phi + \pi)^2$

Answer: B

Watch Video Solution

258. Two simple harmonic motions are given by $y_1 = A_1 \sin \omega t$ and $y_2 = A_2 \sin(\omega t + \phi)$ are acting on the particles in the same direction .The resultant motion is S.H.M., its amplitude is

A. $\sqrt{A_1^2 + A_2^2 + 2A_1A_2 \cos \phi}$

B. $\sqrt{A_1^2 + A_2^2 - 2A_1A_2 \cos \phi}$

C. $A_1^2 + A_2^2 - 2A_1A_2 \cos \phi$

D. $A_1^2 + A_2^2 + 2A_1A_2 \cos \phi$

Answer: A

Watch Video Solution

259. The displacement of a particle performing S.H.M. is, x = 3 sin (314t) + 4 cos (314t), where x and t are in CGS units. Then the amplitude of the S.H.M. is,

A. 7 cm

B. 3 cm

C. 4 cm

D. 5 cm

Answer: D

Watch Video Solution

260. The displacement of a particle performing S.H.M. is x = 3 sin (314 t) + 4 cos (314 t). Then the initial phase angle is,

A. $\tan^{-1}(7)$

B. $\tan^{-1}(4)$

C. $\tan^{-1}(3)$

D. $\tan^{-1}(4/3)$

Answer: D

Watch Video Solution

Watch Video Solution

261. If two particles performing SHM, are given by,

$x_1 = 10 \sin[3\pi t + (\pi / 4)]$ and

$x_2 = 5\left[\sin 3\pi t + \sqrt{3} \cos 3\pi t\right]$

then the ratio of their amplitudes is

A. $2:1$

B. $1:1$

C. $1:2$

D. $1:\sqrt{2}$

Answer: B

Watch Video Solution

262. The displacement of a harmonic oscillator is given by $x = \alpha \sin \omega t + \beta \cos \omega t$. Then the amplitude of the oscillator is,

A. α

B. β

C. $\alpha + \beta$

D. $\left(\alpha^2 + \beta^2\right)^{1/2}$

Answer: D

Watch Video Solution

263. If the two particles performing S.H.M. with same amplitude and initial phase angle, then the initial phase angle of resultant motion depends on

A. initial phase angle only

B. initial phase angle and amplitude of individual

C. amplitudeof individual only

D. neither amplitude nor initial phase angle

Answer: A

View Text Solution

264. If the two particles performing S.H.M. with different initial phase angle and amplitude, then the initial phase angle of resultant motion depends on

A. initial phase angle only

B. initial phase angle and amplitude of individual

C. amplitude of individual only

D. neither amplitude nor initial phase angle

Answer: B

View Text Solution

265. If the two particles performs S.H.M. of same initial phase angle but different amplitudes of individuals, then the resultant motion initial phase angle depends on

A. initial phase angle only

B. initial phase angle and amplitude of individual

C. amplitude of individual only

D. neither amplitude nor initial phase angle

Answer: A

Watch Video Solution

266. The two particles performing S.H.M. have a phase difference of π. If the amplitude of second particle is three times the amplitude of first particle, then the amplitude of resultant motion will be

A. equal to initial

B. three times initial

C. twice the initial

D. half of the initial

Answer: C

Watch Video Solution

267. The displacement of a particle performing S.H.M. is x = 0.1 sin $(5\pi t) + 0.4\cos(5\pi t)m.$

Then the speed of the particle at 0.1 s will be

A. 82π

B. 2π

C. π

D. 0

Answer: B

Watch Video Solution

268. The displacement of a particle performing S.H.M. is x = 0.1 sin $(5\pi t) + 0.4\cos(5\pi t)m.$

Then acceleration of the particle at 0.1 s is

A. $10\pi m / s$

B. $-2\pi^2 m / s^2$

C. $-2.5\pi^2 m / s^2$

D. $4\pi^2 m / s^2$

Answer: C

Watch Video Solution

269. The displacement of a particle executing S.H.M. is given by x = 0.34 sin (300 t + 0.68)m. Then its frequency is

A. $\frac{300}{\pi} Hz$

B. $\frac{300}{2\pi}Hz$

C. $\frac{150}{2\pi}Hz$

D. $300Hz$

Answer: B

Watch Video Solution

270. The minimum phase difference between the two simple harmonic oscillations

$x_1 = (1/2)\sin\omega t + (\sqrt{3}/2)\cos\omega t$ and

$x_2 = (\sqrt{3}/2)\sin\omega t + (1/2)\cos\omega t$ is

A. $\pi/6$

B. $\pi/3$

C. $\pi/4$

D. $\pi/2$

Answer: A

Watch Video Solution

271. If two simple harmonic motions are given as

$x_1 = A\sin\omega t$ and $x_2 = (A/2)\sin\omega t + (A/2)\cos\omega t$

, then the ratio of their amplitudes is

A. 1

B. 2

C. $1/\sqrt{2}$

D. $\sqrt{2}$

Answer: D

Watch Video Solution

272. The displacement of a particle in S.H.M. is given by $x = \sin \omega t + \sqrt{3} \cos \omega t m$. Then at t = 0 its displacement in metres is

A. 0.5

B. $\sqrt{3}$

C. 1

D. $1/\sqrt{2}$

Answer: B

Watch Video Solution

273. The displacement of a particle in SHM is given by $x = \sin\omega t + \cos\omega t$. Then its amplitude and initial displacement are

A. $1, \sqrt{2}$ units

B. $\sqrt{2}, 1$ units

C. $\sqrt{2}, \sqrt{2}$ units

D. 1, 1 units

Answer: B

Watch Video Solution

274. The period of oscillation of a simple pendulum at a given place with acceleration due to gravity 'g' depends on

A. the length of the pendulum 'l' only

B. both 'l' and 'm' of the pendululm

C. mass of the bob of the pendulum only

D. l' and 'g'

Answer: A

Watch Video Solution

275. Second's pendulum is taken from the surface of the earth to the surface of the moon in order to maintain the period constant

A. the length of the pendulum has to be decreased

B. the length of the pendulum has to be increased

C. the amplitude of the pendulum has to be increased

D. the amplitude of the pendulum has to be decreased

Answer: A

Watch Video Solution

276. The period of a simple pendulum is doubled, when

A. its length is doubled

B. the mass of the bob is doubled

C. its length is four times

D. the amplitude of the pendulum is double and the length of the pendulum also double

Answer: C

Watch Video Solution

277. Ideal simple pendulum can not exist practically because

A. heavy point mass and in extensible string is not possible

B. perfectly rigid support is not possible

C. the bob is not symmetric

D. a' and 'b'

Answer: D

Watch Video Solution

278. The practical simple pendulum is a

A. heavy metallic sphere suspended from a light weight slightly extensible string

B. suspended from a rigid support

C. a' and 'b'

D. light weight in extensible string from rigid support

Answer: C

View Text Solution

279. The motion of a simple pendulum when it oscillates with small amplitude is

A. angular S.H.M. only

B. angular and linear S.H.M.

C. linear S.H.M. only

D. linear complex oscillatory motion

Answer: C

Watch Video Solution

280. The period of simple pendulum

A. increases with decreases in length

B. increases with increases in length

C. increases with keeping length constant

D. decrease with decrease in acceleration due to gravity

Answer: B

Watch Video Solution

281. The equation $T = 2\pi\sqrt{l/g}$ is valid only when

A. the length of the pendulum is less than the radius the earth

B. the length of the pendulum is greater than or equal to radius by the earth

C. the length of pendulum is independent of the radius of the earth

D. length of the pendulum is equal to radius and the earth.

Answer: A

Watch Video Solution

282. If a watch with a wound spring is taken on to the moon, it

A. runs faster

B. runs slower

C. does not work

D. shows no change

Answer: D

Watch Video Solution

283. The graph between the length and square of the period of a simple pendulum is a

A. circle

B. parabola

C. straight line

D. hyperbola

Answer: C

Watch Video Solution

284. Time period of simple pendulum increase with

A. increase in value of g

B. increase in amplitude

C. decrease in value of g

D. decrease in amplitude

Answer: C

Watch Video Solution

285. If the pendulum is taken inside the mines or on the hills. The time period

A. increases

B. decreases and increases respectively

C. decreases

D. increases and decreases respectively

Answer: A

Watch Video Solution

286. In a simple pendulum if iron sphere is replaced by a wooden sphere of same mass its time period of oscillation will

A. T increases

B. T remains unchanged

C. T decreases

D. first increases and then decreases

Answer: B

Watch Video Solution

287. Time period of simple pendulum of wire is independent

A. mass of the bob and amplitude of oscillations

B. amplitude of oscillation

C. temperature of the bob

D. acceleration due to gravity

Answer: A

Watch Video Solution

288. Time period of simple pendulum suspended from a metallic wire

A. increases with increases in temperature of the wire

B. increases with decreasing temperature of the wire

C. decreases with decreasing in temperature

D. can not be predicted

Answer: A

Watch Video Solution

289. The time period of a simple pendulum gets increased, it it is made to oscillates in a liquid whose density is

A. less than the density of the material of the bob

B. greater than the density of the material of the bob

C. equal to the density of the material of the bob

D. less than or equal to density of the material at the bob

Answer: A

Watch Video Solution

290. A simple pendulum is oscillating in a lift. If the lift starts moving upwards with a uniform acceleration, the period will

A. increases

B. decreases

C. remains constant

D. first increases and then decreases

Answer: B

Watch Video Solution

291. If a simple pendulum is suspended in a lift and lift is moving downwards an acceleration, time period of simple pendulum

A. increases

B. decreases

C. remains constant

D. first increases and then decreases

Answer: A

Watch Video Solution

292. If the rope of the lift breaks, time period of suspended pendulum in a lift is

A. zero

B. abrupt by increases

C. abrupt by decreases

D. infinite

Answer: D

Watch Video Solution

293. If the lift moves up and comes down with uniform speed, then the time period of pendulum in the lift

A. increases

B. there will be no effect

C. decreases

D. can not be predicted

Answer: B

Watch Video Solution

294. A child swinging on a swing in sitting position, stands up, then the time period of the swing will.

A. increases

B. decreases

C. remain same

D. first increase then decrease

Answer: B

Watch Video Solution

295. The period of oscillation of a simple pendulum of constant length at earth surface is T. Its period inside a mine is C

A. greater than T

B. less than T

C. equal to T

D. cannot be compared

Answer: A

Watch Video Solution

296. If a simple pendulum has charge q and is oscillating in a uniform electric field E in the direction of acceleration due to gravity, then its frequency of oscillations

A. increases

B. decreases

C. first increases and later on it remains constant

D. independent of the effect of electric field

Answer: A

Watch Video Solution

297. The time period of spring pendulum is

(A) independent of mass suspended

(B) depends upon the mass suspended

(C) independent of acceleration due to gravity

(D) depends upon the acceleration due to gravity

The correct statement are

A. A and C

B. B and C

C. B and C

D. C only

Answer: B

Watch Video Solution

298. Tension in the string is minimum when the pendulum is at

A. mean position

B. extreme position

C. mid way between mean and extreme position

D. any position

Answer: B

Watch Video Solution

299. The period of a simple pendulum is doubled, when

A. its length is doubled

B. the mass of the bob is doubled

C. its length is made four times

D. the mass of the bob and the length of the pendulum are doubled

Answer: C

Watch Video Solution

300. The period of oscillation of a simple pendulum of constant length at earth surface is T. Its period inside a mine is C

A. greater than T

B. less than T

C. Equal to T

D. cannot be compared

Answer: A

Watch Video Solution

301. A simple pendulum has a hollow sphere containing mercury suspended by means of a wire. If a little mercury is drained off, the period of the pendulum will

A. remains unchanged

B. increase

C. decrease

D. become erratic

Answer: B

Watch Video Solution

302. The work done by the string of a simple pendulum during one complete oscillation is

A. total energy of pendulum

B. kinetic energy of pendulum

C. potential energy of pendulum

D. zero

Answer: D

Watch Video Solution

303. A simple pendulum consisting of a ball of mass m tied to a thread of length l is made to swing on a circular arc of angle q in a vertical plane. At the end of this arc, another ball of mass m is placed at rest. The momentum transferred to this ball at rest by the swinging ball is

A. zero

B. $m\theta\sqrt{\frac{g}{l}}$

C. $\frac{m\theta}{l}\sqrt{\frac{l}{g}}$

D. $\frac{m}{l}2\pi\sqrt{\frac{l}{g}}$

Answer: A

Watch Video Solution

304. Identify correct statement among the following

A. the greater the mass of a pendulum bob, the shorter is its frequency of oscillation

B. a simple pendulum with a bob of mass m swings with an anguluar amplitude of 40° its angular amplitude is 20°, the tension in the string earlier is less than the tension in the string later

C. as the length of a simple pendulum is increased, the maximum velocity of its bob during its oscillations will also increases

D. the fractional change in the time period of a pendulum on changing the temperature is independent of the length of the pendulum

Answer: B

View Text Solution

305. A train moving at a uniform speed has a simple pendulum hung from the ceiling of one of the compartments. The train suddenly experiences a uniform acceleration, during this interval, the time period of the pendulum

A. remains same

B. decreases

C. increases

D. becomes infinite

Answer: B

Watch Video Solution

Watch Video Solution

306. IF the length of a simple pendulum is increased, its maximum velocity during oscillation

A. decreases

B. increases

C. remains same

D. is zero

Answer: A

Watch Video Solution

307. The metal bob of a simple pendulum is positively charged and has certain time period in air. If bob oscillates above a negatively charged metal plate. Its time period now

A. remains same

B. increases

C. decreases

D. none

Answer: C

Watch Video Solution

308. Clock A is based on oscillations of a spring and clock B is based on pendulum motion. Both clocks run at the same rate on earth. On the surface of moon

A. A will run faster than B

B. B will run faster than A

C. both will run at same rates

D. can not be predicated

Answer: A

Watch Video Solution

309. If the metal bob of a simple pendulum is replaced by a wooden bob, then its time period will

A. increases

B. decreases

C. does not change

D. is zero

Answer: C

Watch Video Solution

310. A simple pendulum has a bob which is a hollow sphere full of sand and oscillated with certain period. If all that sand is drained out through a hole at its bottom, then its period

(a) increases

(b) decreases

(c) remains same

(d) is zero.

A. increases

B. decreases

C. remains same

D. is zero

Answer: C

Watch Video Solution

311. A simple pendulum is suspended inside a trolly which is sliding down on an inclined plane, which is frictionless. It oscillates, mean position of that pendulum will be

A. exactly vertical

B. exactly horizontal

C. normal to the inclined surface

D. parallel to the inclined surface

Answer: C

View Text Solution

312. The phase of simple harmonic oscillator is

A. expressed in time

B. expressed in angle

C. expressed in distance

D. a' and 'b'

Answer: D

Watch Video Solution

313. A pendulum clock shows correct time at $0^{\circ} C$.

On a summer day

A. it runs slow and gain time

B. it runs fast and loses time

C. it runs slow and loses time

D. it runs fast and gains time

Answer: C

Watch Video Solution

314. The second's pendulum is taken from earth to moon, to keep time period constant

(a) the length of the second's pendulum should be decreased

(b) the length of the second's pendulum should be increased

(c) the amplitude should increase

(d) the amplitude should decrease.

A. length of the seconds pendulum should be reduced

B. the length of the seconds pendulum should be raised

C. the amplitude should increase

D. the amplitude should decrease

Answer: A

Watch Video Solution

315. Time period of a pendulum in the vacuum as compared to that in atmosphere,

A. does not oscillate

B. decreases

C. increases

D. remains same

Answer: D

Watch Video Solution

316. The tension in the string of a simple pendulum is

A. constant

B. maximum in the extreme position

C. zero in the mean position

D. minimum at extreme position

Answer: D

Watch Video Solution

317. A pendulum clock on the earth is taken on the Jupiter, then it will run

A. slow

B. fast

C. at the same rate

D. first slower then faster and remains same rate

Answer: B

Watch Video Solution

318. A girl is swinging a swing in a standing position. If the girl seat and swings, the period will be

A. shorter

B. longer

C. same

D. first shorter and then longer

Answer: B

Watch Video Solution

319. If the earth stops rotating then the time period of a simple pendulum at the equator would be

A. decreases

B. increase

C. remains unchanged

D. becomes zero

Answer: A

Watch Video Solution

320. For infinitely long length of the pendulum, the time period of the pendulum is

A. 48 min

B. 84.6 min

C. 64 min

D. 32 min

Answer: B

Watch Video Solution

321. Two pendulums oscillates with a constant phase difference of 90° and same amplitude. The maximum velocity of one pendulum is v, then the maximum velocity of the other pendulum will be

A. 2 v

B. v

C. $v\sqrt{2}$

D. $\sqrt{2v}$

Answer: B

Watch Video Solution

322. Two clocks one working with the principle of oscillating pendulum, the other with that of oscillating spring are taken to the moon, then

A. both show correct time one the moon

B. first one only shows correct time

C. second one only shows correct time

D. both show wrong time

Answer: C

Watch Video Solution

Watch Video Solution

323. The angular displacement of a simple pendulum is increased from 2° to 4°. Its frequency of oscillation

A. remains same

B. is doubled

C. is halved

D. is quadrupled

Answer: A

Watch Video Solution

324. A child swinging on a swing in sitting position, stands up, then the time period of the swing will.

A. increases

B. decreases

C. remains constant

D. becomes zero

Answer: B

Watch Video Solution

325. A man measures the period of a simple pendulum inside a stationary lift and finds it to be T sec. if the lift accelerates upwards with an acceleration g/4, then the period of the pendulum will be

A. T

B. $\frac{T}{\sqrt{2}}$

C. $\sqrt{2}T$

D. $\frac{T}{2^{1/4}}$

Answer: D

Watch Video Solution

Watch Video Solution

326. The time period of an oscillating spring of mass 630 g and spring constant 100 N/m with a load of 1 kg is

A. $0.2\pi s$

B. $0.21\pi s$

C. $0.22\pi s$

D. $0.02\pi s$

Answer: C

Watch Video Solution

327. The length of a second's pendulum on the surface of earth is 1 m. What will be the length of a second's pendulum on the moon?

A. $1/5m$

B. $1/6m$

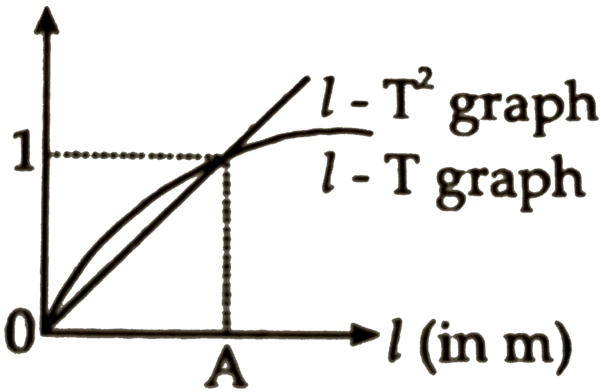
C. $1/3m$

D. $1m$

Answer: B

Watch Video Solution

328. l - T and $l - T^2$ graphs of a simple pendulum on earth are as shown in the figure. The x-coordiante (OA) of point of intersection of the graphs is nearly equal to (on the earth $g = 9.8 ms^{-2}$)



A. 20 cm

B. 25 cm

C. 50 cm

D. 100 cm

Answer: B

Watch Video Solution

329. Time period of simple pendulum of length l at a place, where acceleration due to gravity is g and period T. Then period of simple pendulum of the same length at a place where the acceleration due to gravity 1.02 g will be

A. T

B. 1.02 T

C. 0.99 T

D. 1.01 T

Answer: C

Watch Video Solution

330. The time period of a second's pendulum is 2 sec. The spherical bob which is empty from inside has a mass of 50 gm. This is now replaced by another solid bob of same radius but having different mass of 100 gm. The new time period will be

A. 4 s

B. 1 s

C. 2 s

D. 8 s

Answer: C

Watch Video Solution

331. A body has a time period (4/5) s under the action of one force and (3/5) s under the action of another force. Then time period when both the forces are acting in the same direction simultaneously will be

A. $4/5s$

B. $5/4s$

C. $1s$

D. $12/25s$

Answer: D

Watch Video Solution

Watch Video Solution

332. A body has a time period (4/5) s under the action of one force and (3/5) s under the action of another force. Then time period when both the forces are acting in the opposite direction simultaneously will be

A. $4/5s$

B. $5/4s$

C. 1 s

D. $12/5\sqrt{7}s$

Answer: D

Watch Video Solution

333. The length of a simple pendulum is increased by 1%. Its time period will

A. increase by 0.5 %

B. increase by 1 %

C. increase by 2 %

D. decrease by 0.5 %

Answer: A

Watch Video Solution

334. If a simple pendulum is taken to place where g decreases by 2%, then the time period

A. increase by 2 %

B. increase by 1 %

C. increase by 4 %

D. decrease by 1 %

Answer: B

Watch Video Solution

335. The length of second's pendulum is increased by 21 %, then time period will increase by

A. 0.015

B. 0.21

C. 0.055

D. 0.1

Answer: D

Watch Video Solution

336. If a pendulum clock keepds correct time at sea level is taken to a place 1 km above sea level the clock will approximately

A. gains 13.5 s/day

B. loses 13.5 s/day

C. loses 7 s/day

D. gains 7 s/day

Answer: B

Watch Video Solution

337. If a pendulum clock, keeps correct time at sea level is taken to a place 16 km below sea level, the clock will approximately

A. gains 13.5 s/day

B. loses 13.5 s/day

C. loses 108 s/day

D. gains 7 s/day

Answer: C

Watch Video Solution

338. If the length of a second's pendulum is decreased by 0.1 %, the pendulum gain or lose per day will be

A. gains 43.2 s

B. loses 43.2 s

C. loses 7 s

D. loses 13.5 s

Answer: A

Watch Video Solution

339. A pendulum clock, keeps correct time at sea level, when taken to a place 1km below sea level, the clock loses or gain per day will be

A. gains 13.5 s

B. loses 13.5 s

C. loses 7 s

D. gains 7 s

Answer: C

Watch Video Solution

340. Two pendulums have time period T and 5T/4. They starts SHM at the same time from the mean position. What will be the phase difference between them after the bigger pendulum completed one oscillation ?

A. $\frac{\pi}{4}$

B. $\frac{\pi}{2}$

C. $\frac{3\pi}{3}$

D. $\frac{\pi}{6}$

Answer: B

Watch Video Solution

Watch Video Solution

341. If the length of a seconds pendulum is increased by 2% then in a day the pendulum

A. 3927 s

B. 392.7 s

C. 37.38 s

D. 864 s

Answer: D

Watch Video Solution

342. The length of a simple pendulum is increased by 44%. The percentage increase in its time period will be

A. 0.44

B. $\sqrt{44}\ \%$

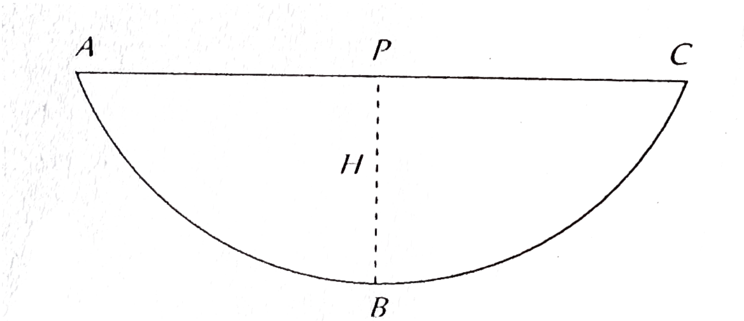
C. 0.2

D. 0.1

Answer: C

Watch Video Solution

343. A simple pendulum with a bob of mass 'm' oscillates from A to C and back to A such that PB is H . If the acceleration due to gravity is 'g' then the velocity of the bob as it passes through B is



A. zero

B. 2gh

C. mgh

D. $\sqrt{2gh}$

Answer: D

Watch Video Solution

344. A simple pendulum, suspended from the coiling of a lift, has a period of oscillation T, when the lift is at rest. If the lift starts moving upwards with an acceleration a =3g, then the new period will be

A. T/2

B. 2T

C. T/3

D. 3T

Answer: A

Watch Video Solution

345. A simple pendulum simple harmonic motion about $x = 0$ with an amplitude a and time period T speed of the pendulum at $x = a/2$ will be

A. $\pi A \frac{\sqrt{3}}{T}$

B. $\pi \frac{A}{T}$

C. $\pi A \frac{\sqrt{3}}{2} T$

D. $3\pi^2 \frac{A}{T}$

Answer: A

Watch Video Solution

346. If the length of seconds pendulum is decreased by 1%, the gain or lose time per day by the pendulum will be

A. gain 432 s

B. lose 443 s

C. gain 4.4 s

D. lose 0.44 s

Answer: A

Watch Video Solution

347. If the length of a simple pendulum is equal to the radius of the earth, its time period will be

A. 84 min

B. 60 min

C. 75 min

D. 48 min

Answer: B

Watch Video Solution

348. A pendulum suspended from the ceiling of the train has a time period of two seconds when the train is at rest, then the time period of the pendulum, if the train accelerates 10 m/s^2 will be $(g = 10 m/s^2)$

A. 2s

B. $2\sqrt{2}s$

C. $2/\sqrt{2}s$

D. $2^{3/4}$

Answer: D

Watch Video Solution

349. Simple pendulum is executing simple harmonic motion with time period T. If the length of the pendulum is increased by 21%, then the increase in the time period of the pendulum of the increased length is:

A. 0.1 s

B. 0.2 s

C. 0.4 s

D. 0.15 s

Answer: B

Watch Video Solution

350. The period of a simple pendulum is found to be increased by 50% when the length of the pendulum is increased by $0.6m$. The initial length is

A. 0.48 m

B. 0.5 m

C. 0.994 m

D. 0.3 m

Answer: A

Watch Video Solution

351. The time period of a seconds pendulum on a planet, whose mass is twice that of the earth and radius is equal to the diameter of the earth, will be

A. 2.828 s

B. 3.742 s

C. 1.414 s

D. 2 s

Answer: A

Watch Video Solution

352. Two simple pendulum of lengths 1 m and 9 m respectively are both given a displacement in the same direction at the same instant. They will again be in phase after the shorter pendulum has completed number of oscillations are

A. $1/4$

B. $3/2$

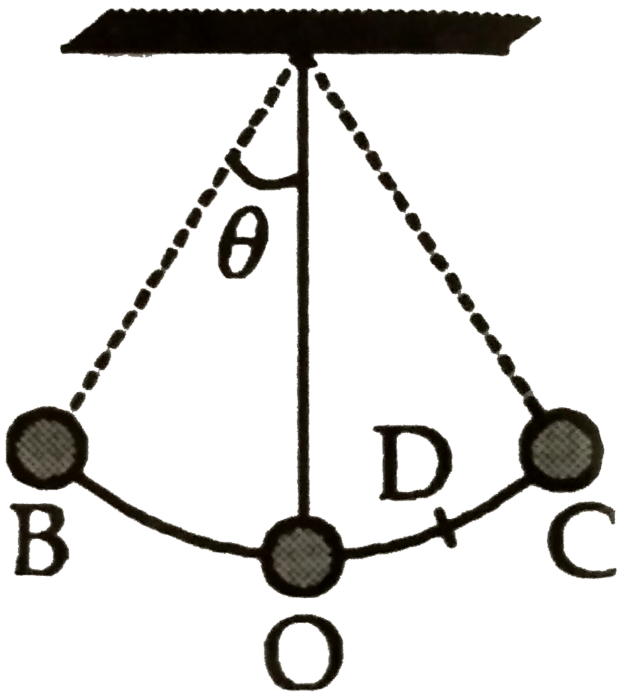
C. $4/3$

D. 2

Answer: B

Watch Video Solution

353. A simple pendulum is moving simple harmonically with a period of 6 s between two extreme positions B and C about a point O. If the distance between B and C is 10 cm, then the time taken by the pendulum to move from position C to position D exactly midway between O and C will be



A. 0.5 s

B. 1.0 s

C. 1.5 s

D. 3 s

Answer: B

Watch Video Solution

354. The time period of a simple pendulum of infinite length is (R=radius of earth).

A. $T = 2\pi\sqrt{\frac{R}{g}}$

B. $T = 2\pi\sqrt{\frac{R}{2g}}$

C. $T = 2\pi\sqrt{\frac{2R}{g}}$

D. T = infinite

Answer: A

Watch Video Solution

355. The length of the pendulum is increased by 90 cm and period is doubled then it's original length will be

A. 30 cm

B. 60 cm

C. 90 cm

D. 45 cm

Answer: A

Watch Video Solution

356. The frequency of the seconds pendulum is

A. 1 Hz

B. 2 Hz

C. 0.5 Hz

D. 3 Hz

Answer: C

Watch Video Solution

357. A simple pendulum of length l has maximum angular displacement θ . Then maximum kinetic energy of a bob of mass m is

A. $ml/2g$

B. $mg/2l$

C. $mgl(1-\cos\theta)$

D. $mgl\sin(\theta/2)$

Answer: C

Watch Video Solution

358. A pendulum clock keeps correct time at $20^{\circ}C$ and coefficient of linear expansion of pendulum is $12 \times 10^{-6}/.^{\circ}C$. If the room temperature increases to $40^{\circ}C$, how many seconds the clock lose or gain per day?

A. 10.36 s

B. 20.6 s

C. 5 s

D. 20 minutes

Answer: A

Watch Video Solution

359. A simple pendulum is suspended from the roof of a train. If the train is moving with an acceleration $49cm/s^2$. Then the angle of inclination of the string about the vertical will be

A. 20°

B. zero

C. 30°

D. 3°

Answer: D

Watch Video Solution

360. Two pendulum start oscillation in the same direction at a same time from the same mean position time period are respectively $2s$ and $1.5s$.

The phase difference between them, when the smaller pendulum is completed vibration, will be

A. $\frac{\pi}{4}$

B. $\frac{2\pi}{3}$

C. $\frac{\pi}{2}$

D. $\frac{3\pi}{2}$

Answer: C

Watch Video Solution

361. If the length of the seconds pendulum is increases by 4%, how many seconds it will lose per day?

A. 3456 s

B. 864 s

C. 432 s

D. 1728 s

Answer: D

Watch Video Solution

362. A simple pendulum of length 1 m, and energy 0.2 J, oscillates with an amplitude 4 cm. When its length is doubled then the energy of oscillation will be

A. 0.04 J

B. 0.1 J

C. 0.02 J

D. 0.8 J

Answer: B

Watch Video Solution

363. Two simple pendulums of equal length cross each other at mean position. Then their phase difference is

A. π radian

B. $\frac{3\pi}{2}$ radian

C. $\frac{\pi}{2}$ radian

D. 0 radian

Answer: A

Watch Video Solution

364. Length of second's pendulum is decreased by 1%, then the gain or loss in time per day will be

A. gain 4.40 s

B. gain 432 s

C. loses 4.40 s

D. loses 44 s

Answer: B

Watch Video Solution

365. A body of mass $1kg$ is suspended from a weightless spring having force constant $600N/m$. Another body of mass $0.5kg$ moving vertically upward hits the suspended body with a velocity of $3.0m/s$ and get embedded in it. Find the frequency of oscillations and amplitude of motion.

A. $\frac{\pi}{10}Hz$

B. $\frac{10}{\pi}Hz$

C. $\frac{1}{2\pi}Hz$

D. 3.142 Hz

Answer: B

Watch Video Solution

366. If acceleration due to gravity on the moon is one-sixth that on the earth, then the length and time period of seconds pendulum on the surface of moon are

A. 6 m, 1.5 s

B. 1/6 m, 2 s

C. 1/6 m, 0.5 s

D. 6 m, 2 s

Answer: B

Watch Video Solution

367. A simple pendulum has some time period T. What will be the percentage change in its time period if its amplitude is decreased by 5%

A. 0.06

B. 0.03

C. 1.5%

D. it will remain unchanged

Answer: D

Watch Video Solution

Watch Video Solution

368. A pendulum bob has a speed of $3ms^{-1}$ at its lowest position. The pendulum is 0.5 m long. The speed of the bob, when string makes an angle of 60° to the vertical is $\left(\text{take, g} = 10ms^{-1}\right)$

A. $\frac{3}{2}m/s$

B. $2m/s$

C. $\frac{1}{2}m/s$

D. $3m/s$

Answer: B

Watch Video Solution

369. A man measures the period of a simple pendulum inside a stationary lift and finds it to be T sec. if the lift accelerates upwards with an acceleration g/4, then the period of the pendulum will be

A. T

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

C. $\frac{2T}{\sqrt{5}}$

D. $2T\sqrt{5}$

Answer: C

Watch Video Solution

370. The periodic time of a simple pendulum of length 1 m and amlitude

Watch Video Solution

371. A second's pendulum is placed in a space laboratory orbiting around the earth at a height $3R$, where R is the radius of the earth. The time period of the pendulum is

A. zero

B. $2\sqrt{3}s$

C. 4 s

D. infinite

Answer: D

Watch Video Solution

372. The bob of a simple pendulum of length L, is displaced through 90°, from its mean position and then released. What will be the tension in the string when the bob of mass m will be at its lowest position?

A. mg

B. 3 mg

C. 2 mg

D. 6 mg

Answer: B

Watch Video Solution

373. The time period of a simple pendulum is 2s. It its length is increased by 4 times, then its period becomes

A. 16 s

B. 12 s

C. 8 s

D. 4 s

Answer: D

Watch Video Solution

374. Two simple pendulum of length $5m$ and $20m$ respectively are given small displacement in one direction at the same time. They will again be in the same phase when the pendulum of shorter length has completed oscillation.

A. 5

B. 1

C. 2

D. 3

Answer: C

Watch Video Solution

375. 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. $0.157m/s$

C. $0.8m/s$

D. $0.16m/s$

Answer: B

Watch Video Solution

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

A. $5:4$

B. $4:5$

C. $25:16$

D. $16:25$

Answer: C

Watch Video Solution

377. A simple pendulum with a metallic bob has a time period T. IF the bob is immersed in a non viscous liquid and its time period is measured as 4 T, then the ratio of densitites of metal bob to that of the liquid will be

A. $15 : 16$

B. $16 : 15$

C. $1 : 16$

D. $16 : 1$

Answer: B

Watch Video Solution

378. An accurate pendulum clock is mounted on ground floor of a high building. How much time will it lose or gain in one day if its is transferred to top storey of a building which is h = 200m higher than the ground floor? Radius of earth is 6.4×10^6

A. loses 8640 s

B. gains 4.32 s

C. loses 8.64 s

D. gains 8.64 s

Answer: C

Watch Video Solution

379. A simple pendulum oscillates with an amplitude of $2 \times 10^{-2}m$. If the force acting on it at extreme position is 4 N. Then the time that another simple pendulum of length 81 cm takes to execute the same number of oscillations is

A. 4N

B. 3N

C. 2N

D. 1N

Answer: C

View Text Solution

380. A simple pendulum of length 121 cm takes 11/3 minutes to execute 100 oscillations. Then the time that another simple pendulum of length 81 cm takes to execute the same number of oscillations is

A. 2 minutes

B. 3 minutes

C. 6 minutes

D. 9 minutes

Answer: B

Watch Video Solution

381. A simple pendulum of length l_1 has frequency 1/4 Hz and another simple pendulum of length l_2 has frequency 1/3 Hz. Then time period of pendulum of length $(l_1 - l_2)$ is

A. 5 s

B. 1 s

C. $\sqrt{7}s$

D. $\sqrt{12}s$

Answer: C

Watch Video Solution

382. A simple pendulum of length l_1 has frequency 1/4 Hz and another simple pendulum of length l_2 has frequency 1/3 Hz. Then time period of pendulum of length $(l_1 - l_2)$ is

A. 5 s

B. 1 s

C. $\sqrt{7}s$

D. $\sqrt{12}s$

Answer: C

Watch Video Solution

383. Two identical simple pendulums oscillate with amplitudes 6 cm and 2 cm respectively. Then ratio of their energies of oscillation are

A. $3:1$

B. $1:3$

C. $9:1$

D. $1:9$

Answer: C

Watch Video Solution

384. The length of a pendulum changes from $1m$ to $1.21m$. The percentage change in its period is

A. 20%

B. 21%

C. 10%

D. 11%

Answer: C

Watch Video Solution

385. A second's pendulum has a hollow spherical bob of mass $25 \times 10^{-3} kg$. It is replaced by another solid bob of same radius but of mass $50 \times 10^{-3} kg$. Then the new time period will be

A. 6s

B. 4s

C. 3s

D. 2s

Answer: D

Watch Video Solution

386. The length of a seconds pendulums is 100 cm. To have a period half of this value the length is to reduced by

A. 25cm

B. 75cm

C. 50cm

D. 100cm

Answer: B

Watch Video Solution

387. Pendulum A and B having periodic times 4 s and 4.2 s, are made to oscillate simultaneously. At time t = 0, they are in the same phase. After how many complete oscillations of A, they will be again

in the same phase?

A. 7

B. 14

C. 21

D. 28

Answer: C

Watch Video Solution

388. If length of seconds pendulum is increased by 0.3%, its new time period would be

A. 2.0018 s

B. 2.0009 s

C. 2.06 s

D. 2.003 s

Answer: D

Watch Video Solution

389. The maximum tension in the string of a simple pendulum is 1.2 times the minimum tenstion. If 0_0 is the angular amplitude, then 0_0 is

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

B. $\frac{3}{5}$

C. $\frac{3}{4}$

D. $\frac{2}{3}$

Answer: B

Watch Video Solution

390. If the period of pendulum oses 13.5 s/day at 1 km above the surface of earth, then the period of pendulum 1 km below the surface of the earth loses will be

A. 7 s

B. 13.5 s

C. 14 s

D. 27 s

Answer: A

Watch Video Solution

391. The ratio of the height of the mountain and the depth of a mine, if a pendulum swings with the same period at the top of the mountain and at the bottom of the mine is

A. $1:1$

B. $1:2$

C. $2:1$

D. $4:1$

Answer: B

Watch Video Solution

392. A simple pendulum of length 25 cm has a time period of 1 s and another pendulum of length 100cm has a time period of 2s. The time period of a simple pendulum of length 125 cm will be

A. 3 s

B. 2.5 s

C. $\sqrt{5}s$

D. $\sqrt{7}s$

Answer: C

Watch Video Solution

393. A simple pendulum oscillating in air has a time period of $\sqrt{3}$s. Now the bob of the pendulum is completely immersed in a non-viscous liquid whose density is equal to $\frac{1}{4}$th that of the material of the bob. The new time period of simple pendulum will be

A. $\sqrt{2}s$

B. $\sqrt{3}s$

C. $2s$

D. $\sqrt{\frac{7}{2}}s$

Answer: C

Watch Video Solution

394. Two simple pendulums are drawn to same side from their mean position and are released simultaneously. Their time periods are 2 s and 3s. The phase difference between the pendulums when the longer pendulum completes one oscillation is

A. $\frac{\pi}{2}$ rad

B. $\frac{\pi}{2}$ rad

C. $\frac{2\pi}{3}$ rad

D. π rad

Answer: D

Watch Video Solution

395. Two simple pendulums of lengths 100 cm and 144cm start oscillating together at time t = 0. The minimum time after which they swing together is (take $g = \pi^2 ms^{-2}$)

A. 2 s

B. 4 s

C. 10 s

D. 12 s

Answer: D

Watch Video Solution

396. The pendulum of wall clock is a second's pendulum. The number of oscillations made by it in one day is

A. 3600

B. 21600

C. 43200

D. 86400

Answer: C

Watch Video Solution

397. During summer, the time period of the pendulum of a clock changes to 2.02 s from 2 s. The clock runs

A. slow by 14.4 minutes per day

B. fast by 14.4 minutes per day

C. slow by 28.8 minutes per day

D. fast by 28.8 minutes per day

Answer: A

Watch Video Solution

398. The length of a second's pendulum at the equator is L. The length of second's pendulum at the North pole will be

A. $< L$

B. $> L$

C. L

D. $L/2$

Answer: B

Watch Video Solution

399. A second's pendulum on the earth is taken to the moon, where acceleration due to gravity is nearly 1/6 th that on the earth. If it is to act as second's pendulum there too on the moon, its length should be

A. decreased by 17%

B. increased by 17%

C. decreased by 83%

D. increased by 600%

Answer: C

Watch Video Solution

400. The time period of a simple pendulum is T. When the length is increased by 10 cm, its period is T_1. When the length is decreased by 10 cm, its period is T_2. Then, the relation between T, T_1 and T_2 is

A. $\frac{2}{T^2} = \frac{1}{T_1^2} + \frac{1}{T_2^2}$

B. $\frac{2}{T^2} = \frac{1}{T_1^2} - \frac{1}{T_2^2}$

C. $2T^2 = T_1^2 + T_2^2$

D. $2T^2 = T_1^2 - T_2^2$

Answer: C

Watch Video Solution

401. The time period of a simple pendulum at the surface of the earth is T. If it is taken to a height of 640 km, its time period will

A. increase by 20%

B. increase by 10%

C. decrease by 10%

D. decrease by 5%

Answer: B

Watch Video Solution

402. A spring of force constant k is cut into there equal part what is force constant of each part ?

A. K

B. 3 K

C. 2 K

D. 4 K

Answer: B

Watch Video Solution

403. A spring has a natural length of 50 cm and a force constant of 2.0×10^3 Nm^{-1}. A body of mass 10 kg is suspended from it and the spring is stretched. If the body is pulled down to a length of 58 cm and released, it executes simple harmonic motion. The net force on the body when it is at its lowermost position of its oscillation is (10x) newton. Find value of x. (Take g=10m/s^2)

A. 160 N

B. 40 N

C. 60 N

D. 80 N

Answer: C

Watch Video Solution

404. The restoring force on the body of the above problem due to the spring when it is at its upper most position of its oscillation is

A. 160 N

B. 40 N

C. 60 N

D. 80 N

Answer: B

View Text Solution

405. A spring when stretched upto 2 cm has potential energy u. If it is stretched upto 10 cm, potential energy would be

A. u/25

B. u/5

C. 5 u

D. 25 u

Answer: D

Watch Video Solution

406. For a body of mass m attached to the spring the spring factor is given by

A. m / ω^2

B. $m\omega^2$

C. $m^2\omega$

D. $m^2\omega^2$

Answer: B

Watch Video Solution

407. A spring has length'l' and spring constant 'k'. It is cut into two pieces of lengths l_1 and l_2 such that $l_1 = nl_2$. The force constant of the spring of length l_1 is

A. $k(n+1)$

B. $(k/n)(1+n)$

C. k

D. $k/(n+1)$

Answer: B

Watch Video Solution

408. A spring has length'l' and spring constant 'k'. It is cut into two pieces of lengths l_1 and l_2 such that $l_1 = nl_2$. The force constant of the spring of length l_1 is

A. $k(1+n)$

B. $k/n(1+n)$

C. k

D. $k/(n+1)$

Answer: A

Watch Video Solution

409. A spring of force constant k is cut into two pieces whose lengths are in the ratio 1:2. The force constant of the longer piece?

A. $k/2$

B. $3k/2$

C. $2k$

D. $3k$

Answer: B

Watch Video Solution

410. 1 kg weight is suspended to a weightless spring and it has time period T. If now 4 kg weight is suspended from the same spring the time period will be

A. T

B. $T/2$

C. $2T$

D. 4T

Answer: C

Watch Video Solution

411. A spring of force constant k is cut into four equal parts. The force constant of each part will be

A. k

B. 4 k

C. $k/4$

D. 16 k

Answer: B

Watch Video Solution

412. When a mass m is attached to a spring, it normally extends by 0.2 m . The mass m is given a slight addition extension and released, then its time period will be

A. $\frac{1}{\pi}s$

B. $\frac{2\pi}{7}s$

C. 7 s

D. $\frac{1}{7}s$

Answer: B

Watch Video Solution

413. The force constant of an ideal spring is 200 newton per meter. It is loaded with a mass of $200/\pi^2$ kg at the lower end the time period of its vibration is

A. $2\pi^2 s$

B. $2s$

C. $1s$

D. $\pi^2 s$

Answer: B

Watch Video Solution

414. A loaded spring vibrates with a period T. The spring is divided into four equal parts and the same load is divided into four equal parts and the same load is suspended from one end of these parts. The new period is

A. T

B. 2 T

C. $T/2$

D. $T/4$

Answer: C

Watch Video Solution

415. Springs of spring constants k, 2k, 4k, 8k, ... are connected in series. A mass m kg is attached to the lower end of the last spring and the systemm is allowed to vibrate. What is the time period of oscillations? Given $m = 40gm, k = 2.0Ncm^{-1}$.

A. 1 s

B. 0.1256 s

C. 0.5 s

D. 3.142 s

Answer: B

Watch Video Solution

416. A spring having a spring constant k is loaded with a mass m. The spring is cut into two equal parts and one of these is loaded again with the same mass. The new spring constant i

A. $k/2$

B. k

C. 2 k

D. k^2

Answer: C

Watch Video Solution

417. A spring has a force constant k and a mass m is suspended from it the spring is cut in two equal halves and the same mass is suspended from one of the halves. If the frequency of oscillation in the first case is n, then the frequency in the second case will be

A. 2 n

B. $n/\sqrt{2}$

C. n

D. $\sqrt{2}n$

Answer: D

Watch Video Solution

418. A loaded vertical spring executes simple harmonic oscillations with period of 4 s. The difference between the kinetic energy and potential energy of this system oscillates with a period of

A. 8 s

B. 1 s

C. 2 s

D. 4 s

Answer: C

Watch Video Solution

419. When a body is suspended from two light springs separately, the periods of vertical oscillations are T_1 and T_2. When the same body is suspended from the two spring connected in series, the period will be

A. T_1

B. T_2

C. $T_1 + T_2$

D. $\sqrt{T_1^2 + T_2^2}$

Answer: D

Watch Video Solution

420. A mass is suspended separately by two springs of spring constants k_1 and k_2 in successive order. The time periods of oscillations in the two cases are T_1 and T_2 respectively. If the same mass be suspended by connecting the two springs in parallel, (as shown in figure) then the time period of oscillations is T. The correct relations is

A. T_1

B. T_2

C. $\sqrt{T_1^2 + T_2^2}$

D. $\dfrac{T_1 T_2}{\sqrt{T_1^2 + T_2^2}}$

Answer: D

Watch Video Solution

421. Two particles P and Q describe S.H.M. of same amplitue 'A' and frequency n along the same straight line. The resultant displacement amplitude of the two S.H.M.s is $(A/\sqrt{2})$. The initial phase difference between the two particles is nearly

A. π

B. $\frac{\pi}{2}$

C. $\frac{\pi}{4}$

D. $\frac{3\pi}{4}$

Answer: D

Watch Video Solution

422. The time periods for vertical harmonic oscillations of the three systems of single, two series spring and two parallel springs, each springs have a force constant 'k'. The ratio of time periods of the system is

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

B. $\sqrt{2} : 1 : \frac{1}{\sqrt{2}}$

C. $1 : \sqrt{2} : \frac{1}{\sqrt{2}}$

D. $1 : \frac{1}{\sqrt{2}} : \sqrt{2}$

Answer: C

Watch Video Solution

423. Two spring of each force constant k is connected in series and parallel combination is provided with mass m. The ratio of time periods of these two combination is

A. $2:1$

B. $1:\sqrt{2}$

C. $\sqrt{2}:0.5$

D. $\sqrt{2}:1$

Answer: A

Watch Video Solution

424. Two springs of equal lengths and equal cross sectional area are made of materials whose young's moduli are in the ratio of 3 : 2. They are suspended and loaded with the same mass. When stretched and released, they will oscillate with time period in the ratio of

A. $\sqrt{2}:\sqrt{3}$

B. $\sqrt{3}:\sqrt{2}$

C. $3:2$

D. $9:4$

Answer: A

Watch Video Solution

425. A mass on the end of a spring undergoes simple harmonic motion with a frequency of 0.5 Hz. If the attached mass is reduced to one quarter of its value, then the new frequency in Hz is

A. 0.25

B. 1.0

C. 2.0

D. 4.5

Answer: B

Watch Video Solution

426. A spring is stretched by 0.20 m , when a mass of 0.50 kg is suspended. When a mass of 0.25 kg is suspended, then its period of oscillation will be $(g = 10m/s^2)$

A. 0.328 s

B. 0.628 s

C. 0.137 s

D. 1.00 s

Answer: B

Watch Video Solution

427. If a watch with a wound spring is taken on to the moon, it

A. runs faster

B. runs slower

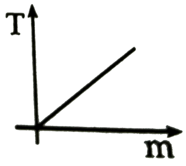
C. does not work

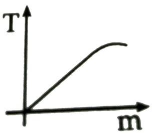
D. shows no change

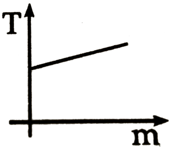
Answer: D

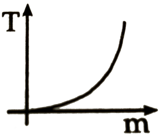
Watch Video Solution

428. The graph between period of oscillation (T) and mass attached (m) to a spring will be

A. a) 

B. b) 

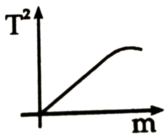
C. c) 

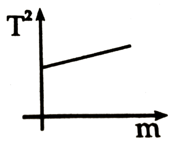
D. d) 

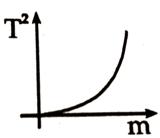
Watch Video Solution

429. If a graph is plotted for the square of period (T^2) and mass attached to a spring, its shape will be

A.

B. b) 

C. c) 

D. d) 

Answer: A

Watch Video Solution

430. A body of mass 1 kg suspended by a light vertical spring of spring constant 100 N/m executes SHM. Its angular frequency and frequency are

A. $\frac{5}{\pi}$ rad/s, 100 Hz

B. 10 rad/s, $\frac{\pi}{5}$ Hz

C. 10 rad/s, $\frac{10}{\pi}$ Hz

D. 10 rad/s, $\frac{5}{\pi}$ Hz

Answer: D

Watch Video Solution

431. A block of mass 0.5 kg hanging from a vertical spring executes simple harmonic motion of amplitude 0.1 m and time period 0.314s. Find the maximum fore exerted by the spring on the blockl.

A. 10 N

B. 20 N

C. 25 N

D. 30 N

Answer: D

Watch Video Solution

432. A block of mass m hangs from a vertical spring of spring constant k. If it is displaced from its equilibrium position, find the time period of oscillations.

A. $\frac{\sqrt{2\pi}}{7}s$

B. $\frac{2\pi}{7}s$

C. $\frac{\pi}{7}s$

D. $\frac{\pi\sqrt{3}}{7}s$

Answer: C

Watch Video Solution

433. A block of mass 2 kg executes SHM on a smooth horizontal plane under the action of restoring force of a spring. If the amplitude and time period of oscillation are 0.05 m and $\pi/5$ second, the maximum force exerted by the spring on the block is

A. 5 N

B. 10 N

C. 100 N

D. 19.6 N

Answer: B

Watch Video Solution

434. A body of mass 10 kg is suspended by a massless coil spring of natural length 40 cm and force constant $2.0 \times 10^3 Nm^{-1}$. What is stretched length of the spring.? If the body is pulled down further stretching the spring to a length 48cm and then released, what is the frequency of oscillations of the suspended mass ? $g = 10ms^2$

A. 0.1 m

B. 0.15

C. 0.2 m

D. 0.25 m

Answer: D

Watch Video Solution

435. A load of mass M is attached to the bottom of a spring of mass $'M/3'$ and spring constant 'K'. If the system is set into oscillation, the time period of oscillation is

A. M

B. 2 M

C. 3 M

D. 4 M

Answer: C

Watch Video Solution

436. 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. 1 rad/s

B. 2 rad/s

C. 4 rad/s

D. 5 rad/s

Answer: B

Watch Video Solution

437. A particle executes simple harmonic motion of ampliltude A. At what distance from the mean position is its kinetic energy equal to its potential energy?

A. 0.51 A

B. 0.61 A

C. 0.71 A

D. 0.81 A

Answer: C

Watch Video Solution

438. Two springs of constants k_1 and k_2 have equal maximum velocities, when executing simple harmonic motion. The ratio of their amplitudes (masses are equal) will be

A. $\frac{k_1}{k_2}$

B. $\frac{k_2}{k_1}$

C. $\left(\frac{k_1}{k_2}\right)^{1/2}$

D. $\left(\frac{k_2}{k_1}\right)^{1/2}$

Answer: D

Watch Video Solution

439. The force constant of a wire is k and that of another wire is . 2k When both the wires are stretched through same distance, then the work done

A. $W_2 = 0.5W_1$

B. $W_2 = W_1$

C. $W_2 = 2W_1$

D. $W_2 = 2W_1^2$

Answer: C

Watch Video Solution

440. 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. $0.16m / s$

C. $0.25m / s$

D. $0.5m / s$

Answer: B

Watch Video Solution

441. The time period of a bar magnet in uniform magnetic field $\vec{B}$ is 'T'. It is cut into two halves, by cutting it parallel to its length then the time period of each part in same field is

A. $\sqrt{2}T$

B. T

C. 2 T

D. none of these

Answer: B

Watch Video Solution

442. W denotes to the total energy of a particle in linear S.H.M. At a point, equidistant from the men position and extremity of the path of the particle

A. K.E. of the particle will be w/2 and P.E. will also be w/2

B. K.E. of the particle will be w/4 and P.E. will be 3 w/4

C. K.E. of the particle will be 3w/4 and P.E. will be w/4

D. K.E. of the particle will be w/8 and P.E. will be 7 w/8

Answer: C

Watch Video Solution

443. In S.H.M. path length is 4 cm and maximum accelertion is $2\pi^2 cm / s^2$. Time period of motion is

Watch Video Solution

444. Time period of pendulum is 6.28 s and amplitude of oscillation is 3 cm. Maximum acceleration of pendulum is

A. $8cm / s^2$

B. $0.3cm / s^2$

C. $3cm / s^2$

D. $58.2cm / s^2$

Answer: C

Watch Video Solution

445. The length of a pendulum is halved. Its energy will be

A. decreased to half

B. increased to 2 times

C. decreased to one fourth

D. increased to 4 times

Answer: B

Watch Video Solution

446. Dimensions of force constant are

A. $[L^0 M^1 T^{-2}]$

B. $[L^0 M^{-1} T^{-2}]$

C. $[L^1 M^0 T^{-2}]$

D. $[LMT^{-2}]$

Answer: A

Watch Video Solution

447. The time period of oscillation of a particle that executes SHM is $1.2s$. The time starting from mean position at which its velocity will be half of its velocity at mean position is

A. $2A$

B. $\frac{\sqrt{3}}{2} \times A$

C. A

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

Answer: B

Watch Video Solution

448. Particle moves from extreme position to mean position, its

A. kinetic energy increases, potential energy decreases

B. kinetic energy decreases, potential increases

C. both remains constant

D. potential energy becomes zero and kinetic energy remains contant

Answer: A

Watch Video Solution

449. Spring is pulled down by 2 cm. What is amplitude of its motion?

A. 0 cm

B. 6 cm

C. 2 cm

D. 4 cm

Answer: C

Watch Video Solution

450. Simple pendulum is executing simple harmonic motion with time period T. If the length of the pendulum is increased by 21%, then the increase in the time period of the pendulum of the increased length is:

A. 0.22

B. 0.2

C. 0.33

D. 0.44

Answer: B

Watch Video Solution

451. A magnet of magnetic moment M oscillates in magnetic field B with time period 2 sec. If now the magnet is cut into two half pieces parallel to the axis, then what is new time period is only one part oscillate in field?

A. 2 s

B. $2\sqrt{2}s$

C. $\frac{1}{\sqrt{2}}s$

D. $2.4s$

Answer: A

Watch Video Solution

452. When a particle performing uniform circular motion of radius 10 cm undergoes the SHM, what will be its amplitude?

A. 10 cm

B. 5 cm

C. 2.5 cm

D. 20 cm

Answer: A

Watch Video Solution

453. The kinetic energy of a particle executing S.H.M. is 16 J when it is at its mean position. If the mass of the particle is 0.32 kg , then what is the maximum velocity of the particle

A. 5 m/s

B. 15 m/s

C. 10 m/s

D. 20 m/s

Answer: C

Watch Video Solution

454. If the KE of a particle performing a SHM of amplitude A is $\frac{3}{4}$ of its total energy, then the value of its displacement is

A. $x = \pm \frac{A}{2}$

B. $x = \pm \frac{A}{4}$

C. $x = \pm \frac{\sqrt{3A}}{2}$

D. $x = \pm \frac{A}{\sqrt{2}}$

Answer: A

Watch Video Solution

455. The frequency of wave is 0.002 Hz. Its time period is

Watch Video Solution

456. The equation of displacement of particle performing S.H.M. is x = 0.25 sin (200 t). The maximum velocity is

A. $100 m / s$

B. $200 m / s$

C. $50 m / s$

D. $150m/s$

Answer: C

Watch Video Solution

457. The maximum velocity for particle in SHM is 0.16 m/s and maximum acceleration is $0.64m/s^2$. The amplitude is

A. $4 \times 10^{-2}m$

B. $4 \times 10^{-1}m$

C. $4 \times 10m$

D. $4 \times 10^{0} m$

Answer: A

Watch Video Solution

458. The pendulum is acting as second pendulum on earth. Its time on a planet, whose mass and diameter are twice that of earth, is

A. $\sqrt{2} s$

B. $2 s$

C. $2\sqrt{2} s$

D. $1/\sqrt{2}$

Answer: C

Watch Video Solution

459. A simple pendulum of length l and mass (bob) m is suspended vertically. The string makes an angle θ with the vertical. The restoring force acting on the pendulum is

A. $mg\tan\theta$

B. $mg\sin\theta$

C. $-mg\sin\theta$

D. $-mg\cos\theta$

Answer: C

Watch Video Solution

460. The displacement of a particle performing simple harmonic motion is given by, $x = 8 \sin \omega t + 6\cos \omega t$, where distance is in cm and time is in second. What is the amplitude of motion?

A. 10 cm

B. 14 cm

C. 2 cm

D. 3.5 cm

Answer: A

Watch Video Solution

461. If a bar magnet of magnetic moment M is kept in a uniform magnetic field B, its time period of oscillation is T. The another magnet of same length and breath is kept in a same magnetic field.

If magnetic moment of new magnet is $M/4$, then its oscillation time period is

A. T

B. 2T

C. $T/2$

D. $T/4$

Answer: B

Watch Video Solution

462. A particle of mass m is executing SHM about its mean position. The total energy of the particle at given instant is

A. $\frac{\pi^2 m A^2}{T^2}$

B. $\frac{2\pi^2 m A^2}{T^2}$

C. $\frac{4\pi^2 m A^2}{T^2}$

D. $\frac{8\pi^2 m A^2}{T^2}$

Answer: B

Watch Video Solution

463. A load of mass 100 gm increases the length of wire by 10 cm. If the system is kept in oscillation, its time period is $(g = 10m / s^2)$

A. $0.314s$

B. $3.14s$

C. $0.628s$

D. $6.28s$

Answer: C

Watch Video Solution

464. The acceleration due to gravity changes from $9.8 m/s^2$ to $9.5 m/s^2$. To keep the period of pendulum constant, its length must changes by

A. 3 m

B. 0.3 m

C. 0.003 m

D. 3 cm

Answer: D

Watch Video Solution

465. Starting from the extreme position, the time taken by an ideal simple pendulum to travel a distance of half the amplitude is

A. $T/6$

B. $T/12$

C. $T/13$

D. $T/4$

Answer: A

Watch Video Solution

466. A mass M is suspended from a spring of negiliglible mass the spring is pulled a little and then released so that the mass executes simple harmonic oscillation with a time period T If the mass is increases by m the time period because $\left(\frac{5}{4} T\right)$,The ratio of $\frac{m}{M}$ is

A. $9: 16$

B. $25: 16$

C. $25: 9$

D. $19: 9$

Answer: A

Watch Video Solution

467. In SHM, graph of which of the following is a straight line?

A. T.E. against displacement

B. P.E. against displacement

C. acceleration against time

D. velocity against displacement

Answer: A

Watch Video Solution

468. A magnet, when suspended in an external magnetic field, has a period of oscillation of 4 s. When it is cut length wise, and suspended in the same magnetic field, the period of vibration will be

A. $2\sqrt{2}s$

B. $2s$

C. $4\sqrt{2}s$

D. $8s$

Answer: B

View Text Solution

469. A body performing SHM about its mean position with period 24 s, after 4 s its velocity is $\pi m / s$, then its path will be

A. 48 m

B. 24 m

C. 52 m

D. 12 m

Answer: B

Watch Video Solution

470. In simple harmonic motion, the wrong statement is

A. velocity of the body is maximum at mean position

B. kinetic energy is minimum at extreme position

C. its acceleration is maximum at extreme position and direction away from mean position

D. its acceleration is minimum at mean position

Answer: C

Watch Video Solution

471. Time period of pendulum on earth surface is T_1. Its time period at a height equal to radius of earth is T_2, then the ratio of $T_1 : T_2$ is

A. $8 : 10$

B. $5 : 10$

C. $1 : 1$

D. $2 : 10$

Answer: B

Watch Video Solution

472. A bar magnet is oscillating in a uniform magnetic field of induction $0.4 \times 10^{-5} T$. When the frequency of the oscillating bar magnet is double due to increasing magnetic field, the increase in magnetic induction is

A. $1.2 \times 10^{-4} T$

B. $1.2 \times 10^{-5} T$

C. $1.6 \times 10^{-4} T$

D. $1.6 \times 10^{-5} T$

Answer: D

Watch Video Solution

473. The total work done by a restoring force in simple harmonic motion of amplitude A and angular velocity. ω, in one oscillation is

A. $\frac{1}{2} m A^2 \omega^2$

B. Zero

C. $m A^2 \omega^2$

D. $\frac{1}{2}mA\omega$

Answer: B

Watch Video Solution

474. In simple harmonic motion, acceleration of the particle is zero, when its

A. velocity is zero

B. displacement is zero

C. both velocity and displacement are zero

D. both velocity and displacement are maximum

Answer: A

Watch Video Solution

475. An amplitue of a simple pendulum of a period 'T' and length 'L' is increased by 5%. The new period of that pendulum will be

A. $\frac{T}{8}$

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

C. $\frac{T}{2}$

D. T

Answer: D

Watch Video Solution

476. The maximum velocity of a particle executing S.H.M. is u. If the amplitude is doubled and the time period of oscillation decreases to (1/3) of its original value, then the maximum velocity will be

A. 18 V

B. 6 V

C. 12 V

D. 3 V

Answer: B

Watch Video Solution

477. For a constant force the work done in stretching if spring constant $k_1 > k_2$ then energy stored in two wire related as

A. $w_1 > w_2$

B. $w_1 = w_2$

C. $w_1 < w_2$

D. $w_2 = 2w_1$

Answer: C

Watch Video Solution

478. Two light waves of amplitudes A_1 and A_2 superimpose with each other such that $A_1 > A_2$. The difference between maximum and minimum amplitudes is

A. $A_1 + A_2$

B. $A_1 - A_2$

C. $2A_1$

D. $2A_2$

Answer: D

Watch Video Solution

479. A particle performing S.H.M. about their mean position with the equation of velocity is given by $4v^2 = 25 - x^2$, then the period of motion is

A. 2π

B. π

C. 3π

D. 4π

Answer: D

Watch Video Solution

480. A simple pendulm has a length L and a bob of mass M. The bob is vibrating with amplitude a .What is the maximum tension in the string?

A. $T_{\max} = mg\left[1 + \left(\frac{A}{l}\right)^2\right]$

B. $T_{\max} = mg\left[1 - \left(\frac{A}{l}\right)^2\right]$

C. $T_{\max} = mg\left[1 - \left(\frac{l}{A}\right)^2\right]$

D. $T_{\max} = mg\left[1 + \left(\frac{l}{A}\right)^2\right]$

Answer: A

Watch Video Solution

481. A mass (m) is suspended at the end of a weightless wire of length L, cross-sectional area A and Young's modulus Y. The period of oscillation for the S.H.M. along the vertical direction is,

A. $2\pi\sqrt{\frac{YA}{mL}}$

B. $2\pi\sqrt{\frac{mL}{YA}}$

C. $2\pi\sqrt{\frac{mY}{AL}}$

D. $2\pi\sqrt{\frac{AL}{mY}}$

Answer: B

Watch Video Solution

482. A flat spiral spring of force constant k is loaded with mass M and oscillate about vertical with a time period T. Then the mass suspended to the free end is

A. $\frac{4\pi^2}{kT^2}$

B. $\frac{kT^2}{4\pi^2}$

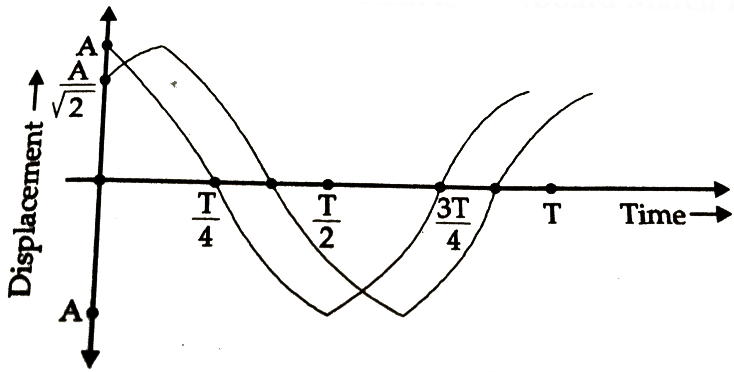
C. $\frac{kT}{4\pi^2}$

D. $\frac{kT}{4\pi}$

Answer: B

Watch Video Solution

483. Two particles perform linear simple harmonic motion along the same path of length 2 A and period T as shown in the graph below. The phase difference between them is



A. zero rad

B. $\frac{\pi}{4}$ rad

C. $\frac{\pi}{2}$ rad

D. $\frac{3\pi}{4}$ rad

Answer: B

Watch Video Solution

484. A particle executing linear S.H.M. has velocities v_1 and v_2 at distances x_1 and x_2 respectively from the mean position. The angular velocity of the particle is

A. $\sqrt{\dfrac{x_1^2 - x_2^2}{v_2^2 - v_1^2}}$

B. $\sqrt{\dfrac{v_2^2 - v_1^2}{x_1^2 - x_2^2}}$

C. $\sqrt{\dfrac{x_1^2 + x_2^2}{v_2^2 + v^2}}$

D. $\sqrt{\frac{v_2^2 + v_1^2}{x_2^2 + x_1^2}}$

Answer: B

Watch Video Solution

485. The phase difference between displacement and acceleration of a particle performing S.H.M. is

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

B. π rad

C. 2π rad

D. $\frac{3\pi}{2}$ rad

Answer: B

Watch Video Solution

486. The average displacement over a period of S.H.M. is (A = amplitude of S.H.M)

A. 0

B. A

C. $2A$

D. $4A$

Answer: A

Watch Video Solution

487. A block resting on the horizontal surface executes S.H.M. in horizontal plane with amplitude 'A'. The frequency of oscillation for which the block just starts to slip is (μ = coefficient of friction, g = gravitational acceleration)

A. $\frac{1}{2\pi}\sqrt{\frac{\mu g}{A}}$

B. $\frac{1}{4\pi}\sqrt{\frac{\mu g}{A}}$

C. $2\pi\sqrt{\frac{A}{\mu g}}$

D. $4\pi\sqrt{\frac{A}{\mu g}}$

Answer: A

Watch Video Solution

488. If the metal bob of a simple pendulum is replaced by a wooden bob, then its time period will

A. increase

B. remain same

C. decrease

D. first increase and then decrease

Answer: B

Watch Video Solution

489. A seconds pendulum is suspended in an elevator moving with constant speed in downward direction. The periodic time (T) of that pendulum is

A. less than two seconds

B. equal to two seconds

C. greater than two seconds

D. very much greater than two seconds

Answer: B

Watch Video Solution

490. A particle executes S.H.M. of amplitude 25 cm and time period 3 s. 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. 0.6 s

B. 0.5 s

C. 0.4 s

D. 0.2 s

Answer: B

Watch Video Solution

491. A particle is executing SHM of periodic time T the time taken by a particle in moving from mean position to half the maximum displacement is $(\sin 30^\circ = 0.5)$

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

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

C. $\frac{T}{8}$

D. $\frac{T}{12}$

Answer: D

Watch Video Solution

492. A simple pendulum is oscillating with amplitue A and angular frequency ω At ratio of kinetic energy to potential energy is

A. $\frac{x^2}{A^2 - x^2}$

B. $\frac{x^2 - A^2}{x^2}$

C. $\frac{A^2 - x^2}{x^2}$

D. $\frac{A - x}{x}$

Answer: C

Watch Video Solution

493. Two spring of force constants K_1 and $K_2(K_1 > K_2)$ are stretched by same force. If W_1 and W_2 be the work done stretching the spring then........

A. $W_1 = W_2$

B. $W_1 < W_2$

C. $W_1 > W_2$

D. $W_1 = W_2 = 0$

Answer: B

Watch Video Solution