SHIKSHA CLASSES

BOARD QUESTION PAPER

Subject : Physics   **Topic: 5. Oscillation**   **Total Marks** : 20

Class   : XII   **Time : 1 Hr.**

Section A

Q. 1 :   Select and write the most appropriate answer from given alternatives in each sub-question   **5**

  i)   Which of the following quantities of a simple harmonic motion does not vary sinsoidally with time?

     a) Displacement   b) Velocity   c) Acceleration   d) Total Energy

  ii)   Period of simple pendulum will be doubled if

     a) Its length is increased to four times.

     b) The acceleration due to gravity is doubled.

     c) The mass of the bob is doubled.

     d) The length of the pendulum and mass of the bob are doubled.

  iii)   Presence of a damping in an oscillator.

     a) Reduces the amplitude frequency.

     b) Reduces the amplitude and time period.

     c) Increases the time period and amplitude.

     d) Increases frequency and decreases amplitude.

  iv)   A mass m attached to a spring of force constant k executes S.H.M. given by the equation. $x = 0.5 \cos (0.8\,t - 0.4)$ metre. For this motion the ratio $\dfrac{k}{m}$ (in SI unit) is

     a) 0.4   b) 0.5   c) 0.64   d) 0.8

  v)   A a place where $g = 980$ cm/sec^2 the length of seconds pendulum is about

     a) 50 cm   b) 100 cm   c) 2 cm   d) 2 m

Q.2 : Very short answer type questions.   **2**

  i) State the differential equation of S.H.M.

  ii) Define phase of S.H.M. and epoch of a particle performing S.H.M.

Section B

Attempt any THREE.   **6**

Q.3 : Obtain the differential equation of a particle performing linear S.H.M.

Q.4 : State laws of simple pendulum.

Q.5 : Calculate the length of a seconds pendulum at a place where $g = 9.8 \text{ m/s}^2$.

Q.6 : A particle performing linear SHM has maximum velocity of 20 cm/s and maximum acceleration of 80 cm/s^2. Find the amplitude and periods of oscillation.

Section C

Attempt any one of following.   **3**

Q.7 : Obtain expressions for the kinetic energy, potential energy and total energy of a particle performing linear S.H.M.

Q.8: The displacement of a S.H.M. is given by, $x = 12\sin(0.8\pi t) + 5\cos(0.8\pi t) \text{cm}$. Find the amplitude, period, frequency and initial phase of S.H.M.

Section D

Attempt any one of following.   **5**

Q.9 : i) Show that a linear S.H.M. is the projection of a U.C.M. along any of its diameter.

ii) In summer season, a pendulum clock is regulated as a second's pendulum and it keeps correct time. During winter, the length of the pendulum decreases by 1%. How much will the clock gain or lose in one day. ($g = 9.8 \text{ m/s}^2$)

Q.10 : i) State the differential equation of S.H.M. and hence obtain an expression for the velocity of a particle performing S.H.M. and discuss its minimum and maximum value.

ii) A particle performs S.H.M. of period $\dfrac{2\pi}{\sqrt{3}}$ sec along a path 4 cm long. Calculate the displacement of the particle at which its velocity is numerically equal to acceleration.

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