CBSE

OSCILLATIONS WS 4

Class 11 - Physics

Section A

1. The displacement of a particle is represented by the equation $y = \sin^3 \omega t$. The motion is **[1]**

   a) non-periodic

   b) simple harmonic with period $\frac{\pi}{\omega}$

   c) periodic but not simple harmonic

   d) simple harmonic with period $\frac{2\pi}{\omega}$

2. Motion of an oscillating liquid column in a U-tube is **[1]**

   a) simple harmonic and time period is independent of the density of the liquid

   b) simple harmonic and time-period is directly proportional to the density of the liquid

   c) non-periodic

   d) periodic but not simple harmonic

3. **Assertion (A):** Sine and cosine functions are periodic functions. **[1]**
   Reason (R): Sinusoidal functions repeat it values after a definite interval of time.

   a) Both A and R are true and R is the correct explanation of A.

   b) Both A and R are true but R is not the correct explanation of A.

   c) A is true but R is false.

   d) A is false but R is true.

4. **Fill in the blanks:** **[1]**

   (a) The function which repeats its value in regular interval of time or period is called _____ function. **[1]**

5. What is the period of each of the functions sec ωt and cosec ωt? **[1]**

6. What is a periodic wave function? **[1]**

Section B

7. All trigonometric functions are periodic, but only sine or cosine functions are used to define S.H.M. Why? **[2]**

Section C

8. Which of the following functions of time represent **[3]**

   a. periodic and

   b. non-periodic motion?

   Give the period for each case of periodic motion [ω is any positive constant].

   i. sin ωt + cos ωt

   ii. sin ωt + cos 2 ωt + sin 4 ωt

   iii. $e^{-\omega t}$

   iv. log (ωt)

Section D

9. Two identical springs, each of spring factor k, may be connected in the following ways. Deduce the spring factor of the oscillation of the body in each case. **[5]**

10. The bottom of a dip on a road has a radius of curvature R. A rickshaw of mass M left a little away from the bottom oscillates about the dip. Deduce an expression for the period of oscillation. **[5]**

11. With suitable examples, explain the meaning of a periodic function. Construct two infinite sets of periodic functions with period T. Hence state the Fourier theorem. **[5]**