

Oscillations and Waves – MCQs

1. Simple harmonic motion (SHM) is a type of:

- A) Random motion
 - B) Uniform motion
 - C) Periodic motion
 - D) Uniform circular motion
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2. The acceleration in SHM is:

- A) Constant
 - B) Proportional to displacement
 - C) Inversely proportional to displacement
 - D) Zero
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3. The time taken to complete one oscillation is called:

- A) Frequency
 - B) Period
 - C) Amplitude
 - D) Wavelength
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4. The SI unit of frequency is:

- A) Second
 - B) Hertz
 - C) Joule
 - D) Meter
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5. In SHM, the velocity is maximum when:

- A) Displacement is maximum
 - B) Displacement is zero
 - C) Acceleration is maximum
 - D) Force is maximum
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6. The total energy in SHM is:

- A) Always zero
- B) Always constant
- C) Increases with time
- D) Decreases with time

7. The frequency of SHM depends on:

- A) Amplitude
- B) Time
- C) Mass and spring constant
- D) Displacement

8. Which of the following has the dimensions of frequency?

- A) Time
- B) Mass
- C) Velocity
- D) 1/time

9. For a spring-mass system in SHM, the time period is:

- A) $2\pi m \sqrt{\frac{m}{k}}$
- B) $2\pi k \sqrt{\frac{k}{m}}$
- C) $k \sqrt{km}$
- D) $2\pi k \sqrt{km}$

10. The restoring force in SHM is given by:

- A) $F = -kx$
- B) $F = +kx$
- C) $F = mv$
- D) $F = ma$

11. In SHM, acceleration is maximum when:

- A) Velocity is maximum
- B) Displacement is zero
- C) Displacement is maximum
- D) Energy is minimum

12. The phase difference between velocity and displacement in SHM is:

- A) $\frac{\pi}{4}$
 - B) $\frac{\pi}{2}$
 - C) π
 - D) 0
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13. A wave is a disturbance that:

- A) Moves energy
 - B) Moves particles
 - C) Moves mass
 - D) Stops at boundaries
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14. In a transverse wave, particles of the medium move:

- A) Parallel to wave direction
 - B) Perpendicular to wave direction
 - C) In circular paths
 - D) Do not move
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15. Which quantity is the same for all particles in a wave?

- A) Velocity
 - B) Displacement
 - C) Frequency
 - D) Amplitude
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16. The speed of a wave is given by:

- A) $\lambda \cdot T$
 - B) $\lambda \cdot f$
 - C) f/T
 - D) $\lambda + f$
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17. Sound waves are:

- A) Transverse
 - B) Longitudinal
 - C) Electromagnetic
 - D) None of the above
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18. The wavelength of a wave is the distance between:

- A) Two rarefactions
 - B) Two crests
 - C) Two troughs
 - D) All of the above
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19. A wave has frequency 500 Hz and wavelength 0.68 m. Its speed is:

- A) 340 m/s
 - B) 680 m/s
 - C) 100 m/s
 - D) 0.136 m/s
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20. Beats are produced due to:

- A) Reflection
 - B) Refraction
 - C) Interference
 - D) Diffraction
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Answer Key

- 1. C
- 2. B
- 3. B
- 4. B
- 5. B
- 6. B
- 7. C
- 8. D
- 9. A
- 10. A
- 11. C
- 12. B
- 13. A
- 14. B
- 15. C
- 16. B
- 17. B
- 18. D
- 19. A
- 20. C