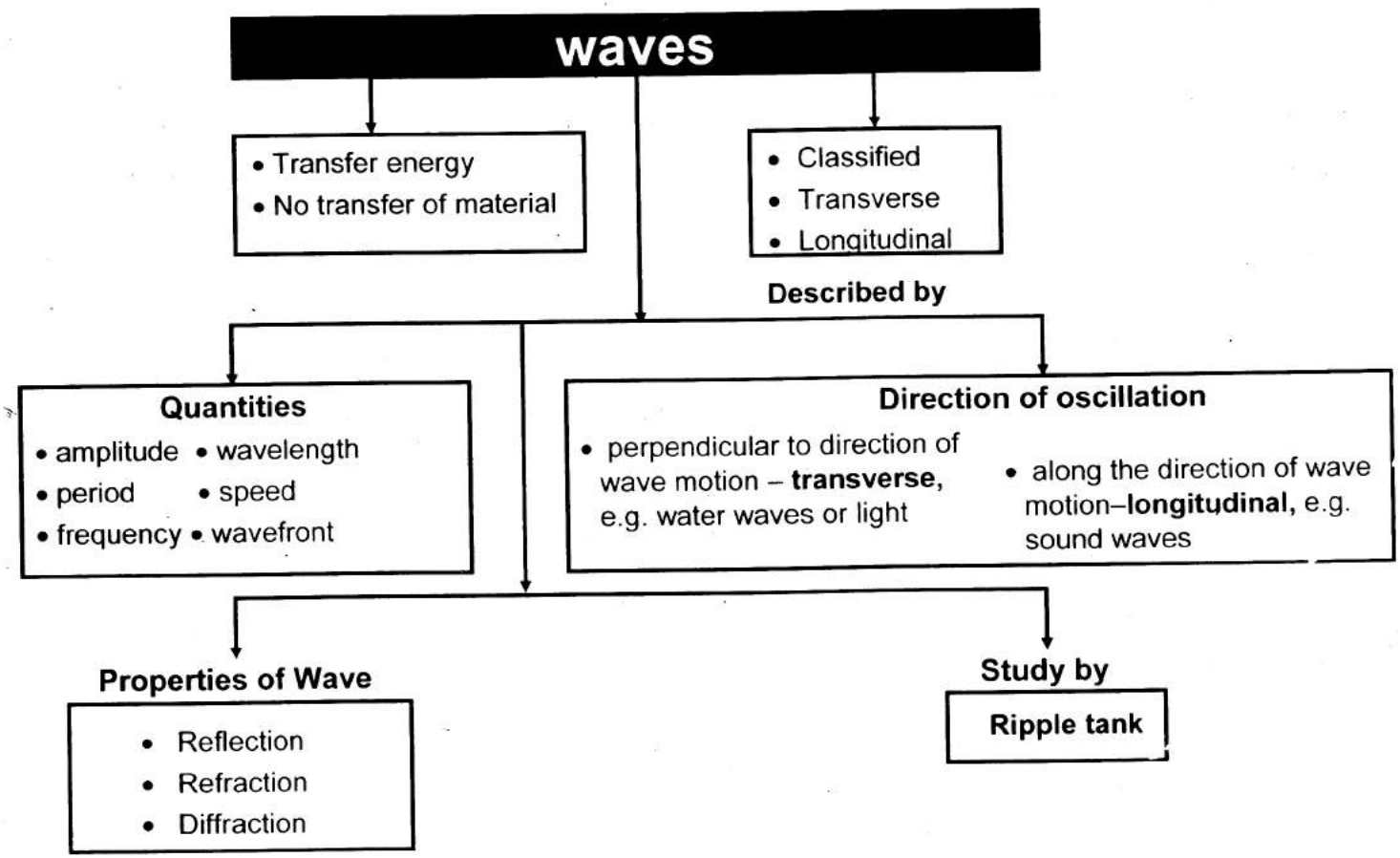
CHAPTER 10

SIMPLE HARMONIC MOTION AND WAVES

CONCEPT MAP



TOPICAL MULTIPLE CHOICE QUESTIONS

10.1 Simple Harmonic Motion

1. **A spider detects its prey due to _____ produced in the web**
   (a) Movement (b) Disturbance (c) Vibration (d) Elasticity
2. **A body is said to be _____if it moves back and forth about a point**
   (a) least circulate (b) vibrating (c) rotating (d) none of these
3. **The particles of the solid can vibrate about their _____**
   (a) vertices (b) edges (c) mean position (d) length
4. **Vibration is also known as**
   (a) Trip (b) Movement (c) Oscillation (d) Circulation

Motion of Mass Attached to spring

5. **Motion of mass attached to spring is an example of _____motion.**
   (a) simple harmonic (b) linear (c) circular (d) vibration
6. **The force applied on a body is directly proportional to the change in length. This is,**
   (a) Weber Fechner law (b) Hooke's Law
   (c) Law of gravitation (d) Archimedes principle
7. **The maximum potential energy of a vibrating mass attached to a spring is at**
   (a) Equilibrium position (b) Extreme position
   (c) Between equilibrium and extreme positions (d) All the above
8. **In F = kx , k indicates,**
   (a) force constant (b) spring constant (c) constant (d) displacement
9. **The value of k depends upon _____ of spring.**
   (a) length (b) width (c) elasticity (d) stiffness
10. **The value of spring constant in case of soft springs is.**
    (a) small (b) large (c) mild (d) none
11. **Force exerted on the body is always directed _____ the displacement of mass.**
    (a) towards (b) opposite to (c) at (d) away from
12. **A _____ force always pushes or pulls the object performing oscillatory motion towards the mean position.**
    (a) gravitational (b) applied (c) spring (d) restoring force
13. **The magnitude of the restoring force _____ with the distance from the mean position.**
    (a) decreases (b) not change (c) increases (d) remains same
14. **Due to _____ the mass does not stop at the mean position but continues its motion.**
    (a) restoring force (b) inertia (c) reactional force (d) gravitational force
15. **The speed of mass _____ as it moves towards the extreme position.**
    (a) remains some (b) increases (c) decreases (d) none of these
16. **The ratio of exerted force to displacement is called _____**
    (a) Hooke's Law (b) spring constant (c) restoring force (d) All of these

17. **Kinetic energy is _____ at extreme position.**
(a) minimum (b) moderate (c) high (d) zero

Ball and Bowl System

18. **In ball and bowl system the _____ force act as restoring force.**
(a) gravitational (b) applied (c) reactional (d) none of these

19. **Ball and bowl system is an example of _____**
(a) gravitational (b) Law of mass action (c) SHM (d) Hooke's law

20. **In ball and bowl system the mean position is at _____**
(a) Earth (b) extreme position (c) floor of bowl (d) centre of bowl

21. **A human eardrum can oscillate back and forth up to _____ times in one second**
(a) 20,000 (b) 2,000 (c) 200,000 (d) 200

22. **The displacement of an object in SHM when the kinetic energy and potential energy is equal is _____**
(*a*) Equilibrium position
(b) Extreme position
(c) In the middle of equilibrium and extreme positions
(d) All the above

23. **The to and fro motion of ball about mean position continues till all its energy is lost due to _____**
(a) gravitational (b) reactional force (c) friction (d) weight

Motion of Simple Pendulum

24. **In _____ position, the net force on bob is zero and the bob is stationary.**
(a) equilibrium (b) frictional (c) extreme (d) none of these

25. **The period of a pendulum is independent of its _____**
(a) length (b) mass (c) amplitude (d) both b and c

26. **The time period T of simple harmonic motion of a mass m attached to a spring is given by _____**
(a) $T = 4\pi\sqrt{\frac{l}{g}}$ (b) $T = 2\pi\sqrt{\frac{l}{g}}$ (c) $T = 2\pi\sqrt{\frac{m}{k}}$ (d) $T = 2\pi\sqrt{\frac{l}{k}}$

27. **Which is example of simple harmonic motion _____**
(a) up and down motion of leaf in water pond (b) motion of a ceiling fan
(c) motion of hands of clock (d) none of these

28. **The time taken by vibrating body to complete one vibration is _____**
(a) Frequency (b) Time period (c) Pitch (d) Altitude

29. **If the mass of bob of a simple pendulum is doubled, its time period**
(a) is doubled (b) becomes four times
(c) remains the same (d) none of the above

30. **If the length of a simple pendulum is halved, its time period T will become**
(a) $\frac{T}{2}$ (b) $\frac{T}{\sqrt{2}}$ (c) $\sqrt{2}T$ (d) 2T

31. **Frequency is _____ of time period**
(a) reciprocal (b) inversely proportional (c) directly proportional (d) none of these

32. **The product of frequency and time period is equal to:**

(a) V (b) 1 (c) 0 (d) λ

33. **Christian Huygen invented the pendulum clock in _____**

(a) 1658 (b) 1657 (c) 1656 (d) 1654

34. **The net force is zero when bob of simple pendulum is**

(a) Moving with uniform speed (b) at rest

(c) Both of these (d) none of these

35. **In case of simple pendulum which component of weight acts as restoring force**

(a) mg $\sin\theta$ (b) mg $\cos\theta$ (c) mg (d) None of these

36. **In SHM acceleration of vibrating body is always directed towards**

(a) extreme position (b) away from extreme position

(c) towards mean position (d) way from extreme position

37. **In SHM acceleration of vibratory motion is maximum at**

(a) mean position (b) extreme position (c) Both a and b (d) None of these

38. **In SHM velocity of vibrating body is maximum at**

(a) Mean position (b) extreme (c) Both a and b (d) none of these

39. **In SHM velocity of vibrating body is zero at**

(a) Mean position (b) Extreme (c) Both a and b (d) non these

40. **Mathematically, S.H.M is represented as**

(a) $a \propto x$ (b) $a \propto -x$ (c) $a \propto -x^2$ (d) $a = x$

41. **If length of simple pendulum is halved its time period becomes**

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

42. **If mass of bob of simple pendulum is doubled its time period will**

(a) doubled (b) Four times (c) remain the same (d) none of these

43. **Which one of the following is not example of SHM**

(a) Mass attached to spring (b) ball and bowel system

(c) simple pendulum (d) A bouncing ball

44. **Time period of simple pendulum is independent of**

(a) mass (b) Amplitude (c) length (d) Both a and b

45. **Time required to complete one cycle is called**

(a) amplitude (b) frequency (c) Time period (d) none of these

46. **Number of vibrations completed in one second is called**

(a) Frequency (b) time period (c) Amplitude (d) none of these

47. **_____developed first pendulum clock that could accurately measure time.**

(a) Galileo (b) Archimedes (c) Einstein (d) Huygens

10.2 Damped Oscillations

48. Vibratory motion of ideal systems in the absence of any friction or resistance continues _____

(a) indefinitely (b) directly (c) definitely (d) all of these

49. The oscillations of a system in the presence of some resistive force are _____

(a) wave motion (b) wavelength (c) damped oscillations (d) both a and b

50. Shock absorbers damp vibrations and convert their energy into _____ energy of oil.

(a) Kinetic (b) potential (c) solar (d) heat

10.3 & 10.4 Wave Motion and Types of mechanical Waves.

51. _____ are travelling disturbance.

(a) waves (b) Power (c) frequency (d) time

52. Wave transfer

(a) energy (b) Power (c) frequency (d) disturbance

53. The are -------- basic types of waves:

(a) 2 (b) 3 (c) 4 (d) 5

54. Such waves which require medium for their production and propagation are called _____ waves:

(a) Radio (b) Some electromagnetic
(c) Mechanical (d) X-rays

55. Electromagnetic waves consist of electric and magnetic fields oscillating _____to each other

(a) opposite (b) perpendicular (c) in accordance (d) both a and b

56. Heat and light waves are _____

(a) electromagnetic (b) damped (c) mechanical (d) none

57. _____are parts of longitudinal wave where loops of spring are far apart from each other.

(a) compressions (b) rarefactions (c) crest (d) troughs

58. Waves which do not require medium is called _____

(a) Electromagnetic waves (b) mechanical waves
(c) Both a and b (d) none of these

59. Electromagnetic waves consist of _____

(a) electric field (b) Magnetic field
(c) electric field and magnetic field (d) none of these

60. Heat and light waves are some example of _____

(a) Mechanical waves (b) Transverse wave
(c) Longitudinal waves (d) Electromagnetic waves

61. Transverse waves move through solids at _____ of the speed of longitudinal waves.

(a) more than half (b) half (c) less than half (d) equal

62. In _____the particles of medium move back and forth along the direction of propagation of waves.

(a) crests (b) longitudinal waves (c) transverse waves (d) compressions