WAVES

Each question has four possible answers, encircled the correct answer:

1. The mechanism in which energy is transferred from one place to another place is called:

(a) Wave motion **(b)** Wave

(c) Mechanical waves **(d)** Sound waves

2. The particle of the medium vibrates in longitudinal waves:

(a) Along the direction of wave motion **(b)** Do not vibrate at all

(c) Opposite the direction of wave motion **(d)** Perpendicular to the direction of wave motion

3. The waves which required certain medium for their propagation are called:

(a) Matter waves **(b)** Mechanical waves

(c) Water waves **(d)** Wave motion

4. The waves which do not required any medium for their propagation are called:

(a) Electromagnetic waves **(b)** Light waves

(c) X-rays **(d)** Radio waves

5. The waves associated with particles in motion are called:

(a) Light waves **(b)** Electronic waves

(c) Matter waves **(d)** Light waves

6. Electrons moving with high velocities behave like:

(a) Mechanical waves **(b)** Electronic waves

(c) Matter waves **(d)** Light waves

7. A mechanical wave is represented by:

(a) Light **(b)** Heat

(c) Compressional waves **(d)** None of the above

8. A wave which transfer energy in moving from the source of disturbance is called:

(a) Travelling waves **(b)** Matter waves

(c) Water waves **(d)** Radio waves

9. When the amplitude of the wave becomes double, its energy becomes:

(a) Four times **(b)** One half

(c) Double **(d)** Nine times

10. The speed of waves can be found indirectly from its:

(a) Frequency and time period **(b)** Frequency and wavelength

(c) Wavelength and time period **(d)** None of the above

11. Waves under ideal conditions may act as sources for transfer of:

(a) Matter only **(b)** Mass only

(c) Energy only **(d)** Transfer both mass and energy

12. The wavelength, frequency and speed of any progressive waves are written as:

(a) $f = \frac{\lambda}{v}$ **(b)** $f = \frac{v}{\lambda}$

(c) $f = v \times \lambda$ **(d)** $f = \lambda + v$

13. The distance between two successive crests or troughs is called:

(a) Area **(b)** Displacement

(c) Amplitude **(d)** Wavelength

14. The portion of the wave above the mean level is called:

(a) Trough **(b)** Crest

(c) Displacement **(d)** Amplitude

15. The portion of the wave below the mean level is called:

(a) Trough **(b)** Crest

(c) Wavelength **(d)** Amplitude

16. Crests and troughs are formed in:

(a) Chemical waves **(b)** Longitudinal waves

(c) Stationary waves **(d)** Transverse waves

17. All parts of the wave pattern move with:

(a) Same speed **(b)** Different speed

(c) Double speed **(d)** None of above

18. The expression $v = f\lambda$ is valid for all types of:

(a) Linear motion **(b)** Angular motion

(c) Wave motion **(d)** Circular motion

19. When a spring under tension is plucked one end at the wave formed as:

(a) Transverse waves **(b)** Square waves

(c) Longitudinal waves **(d)** Compressed waves

20. Waves in which particles of the medium vibrate parallel to the direction of propagation are called:

(a) Transverse waves **(b)** Stationary waves

(c) Longitudinal waves **(d)** Complex waves

21. Passage of waves from one medium into another is called:

(a) Reflection **(b)** Refraction

(c) Transmission **(d)** Diffraction

22. If 30 waves per second pass through a medium at a speed of 30 m/s, wavelength of these waves is:

(a) 30 m **(b)** 15 m

(c) 1 m **(d)** 280 m

23. Distance between two consecutive nodes is:

(a) λ **(b)** $\frac{\lambda}{2}$

(c) $\frac{\lambda}{4}$ **(d)** 2λ

24. The point at which the displacement of the wave is zero called:

(a) Node **(b)** Trough

(c) Anti-node **(d)** Crest

25. The point at which the displacement of the wave is maximum called the:

(a) Node **(b)** Trough

(c) Anti-node **(d)** Crest

26. When two identical waves are superposed, the velocity of the resultant wave:

(a) Becomes zero **(b)** Remains unchanged

(c) Increased **(d)** Decreased

27. When two similar waves moving along the same line in opposite direction are superposed, they give rise to:

(a) Stationary waves **(b)** Longitudinal waves

(c) Compressed waves **(d)** Travelling waves

28. The distance between two consecutive anti-node is:

(a) λ **(b)** 2λ

(c) $\frac{\lambda}{4}$ **(d)** $\frac{\lambda}{2}$

29. The stationary waves consists of:

(a) Crest and troughs **(b)** Nodes and anti-nodes

(c) Reflection & refraction **(d)** None of these

30. Water waves are:

(a) Stationary waves **(b)** Longitudinal waves

(c) Electromagnetic waves **(d)** Transverse waves

31. When a transverse wave is reflected on going from a denser to a rare medium, then:

(a) There is a 180° phase shift **(b)** There is no change in path

(c) A trough is converted into a crest **(d)** A crest is converted into a trough

32. When stationary waves are setup in a cord which is fixed at both ends, the points which always remain at rest is called:

(a) Nodes **(b)** Anti-nodes

(c) Both (a) & (b) **(d)** None of these

33. Expression for Newton's formula for speed of sound is:

(a) $v = \sqrt{\frac{E}{\rho}}$ **(b)** $v = \sqrt{\frac{\rho}{E}}$

(c) $v = \sqrt{\frac{E\gamma}{\rho}}$ **(d)** $v = \sqrt{\frac{\rho\gamma}{E}}$

34. The speed of sound waves is independent of:

(a) Pressure **(b)** Source of sound

(c) Medium **(d)** Temperature

35. The speed of sound in air proposed by Newton is:

(a) 280 m/s **(b)** 332 m/s

(c) 333 m/s **(d)** None of the above

36. Newton's formula for the speed of sound is corrected by:

(a) Graham Bell **(b)** Laplace

(c) Huygen **(d)** Weber-Fechner

37. If E is the modulus of elasticity and ρ is the density then the speed of sound is:

(a) $\sqrt{\frac{1}{E\rho}}$ **(b)** $\sqrt{\frac{E}{\rho}}$

(c) $\sqrt{E\rho}$ **(d)** $\sqrt{\frac{\rho}{E}}$

38. Laplace expression for the speed of sound in gas is:

(a) $v = \sqrt{\frac{\rho P}{\gamma}}$ **(b)** $v = \sqrt{\frac{\rho\gamma}{P}}$

(c) $v = \sqrt{\frac{P}{\gamma\rho}}$ **(d)** $v = \sqrt{\gamma P\rho}$

39. The velocity of sound in air at 0°C is:

(a) 332 m/s **(b)** 300 m/s

(c) 322 m/s **(d)** 280 m/s

40. Velocity of sound in vacuum is:

(a) Zero **(b)** 332 m/s

(c) 280 m/s **(d)** 325 m/s

41. The speed of sound waves in a medium depends upon:

(a) Density of medium **(b)** Amplitude of the particle

(c) Elasticity of medium **(d)** Both density and elasticity of medium

42. The velocity of sound is greatest in:

(a) Steel **(b)** Air

(c) Iron **(d)** Water

43. For all gases:

(a) $v_t = v_0\left(1 - \frac{t}{273}\right)$ **(b)** $v_t = v_0\left(1 + \frac{t}{273}\right)$

(c) $v_t = v_0\left(1 + \frac{273}{t}\right)$ **(d)** $v_t = v_0\,(1 + 273\,t)$

44. For temperature:

(a) $\frac{v_t}{v_0} = \sqrt{\frac{T}{T_0}}$ **(b)** $\frac{v_t}{v_0} = \sqrt{\frac{T_0}{T}}$

(c) $\frac{v_t}{v_0} = \frac{T}{T_0}$ **(d)** $\frac{v_t}{v_0} = TT_0$

45. For small temperature changes, velocity of sound can be determined by the relation:

(a) $v_t = v_0 + 0.61\,t$ **(b)** $v_t = v_0 + 61t$

(c) $v_t = v_0 + 2t$ **(d)** All of the above

46. Increase in velocity of sound in air for 1°C rise in temperature is:

(a) 0.61 m/s **(b)** 61.0 m/s

(c) 1.61 m/s **(d)** 2.00 m/s

47. The speed of sound is greater in solids than in gases due to their high:

(a) Temperature **(b)** Pressure

(c) Density **(d)** Elasticity

48. Which of the following properties for sound is affected by change in air temperature:

(a) Wavelength **(b)** Intensity

(c) Amplitude **(d)** Frequency

49. The superposition of a number of harmonic waves form:

(a) Standing waves **(b)** Complex waves

(c) Transverse waves **(d)** Matter waves

50. At the closed end of an air column, node occurs:

(a) Never **(b)** Always

(c) In certain case **(d)** None of these

51. Two waves having same frequency and traveling in the same direction is called:

(a) Beats **(b)** Interference

(c) Sound waves **(d)** None of these

52. Two waves of different frequency and traveling in the same direction is called:

(a) Interference **(b)** Beats

(c) Stationary waves **(d)** Sound waves

53. The interference in which the two waves are added up is called:

(a) Interaction **(b)** Constructive interference

(c) Destructive interference **(d)** None of these

54. The interference of sound waves in which two waves cancel each other is called:

(a) Interaction **(b)** Constructive interference

(c) Destructive interference **(d)** None of these

55. Two waves can interfere only if they have:

(a) Different frequency **(b)** Same velocity

(c) Propagation in opposite direction **(d)** Phase coherence

56. Periodic alternation of sound between maximum and minimum loudness are called:

(a) Diffraction **(b)** Interference

(c) Beats **(d)** None of these

57. Principle of superposition of waves is applied in:

(a) Formation of beats **(b)** Formation of stationary waves

(c) Interference of sound waves **(d)** All of the above

58. Beats cannot be heard if the difference of frequencies is more than about:

(a) 6 **(b)** 4

(c) 9 **(d)** 10

59. Laws of transverse vibrations of a stretched string are:

(a) $f \propto \sqrt{F}$ **(b)** $F \propto \frac{1}{l}$

(c) $f \propto \frac{1}{\sqrt{m}}$ **(d)** All of the above

60. A stretched string with both ends fixed corresponds to:

(a) A closed end pipe **(b)** An open-end organ pipe

(c) Both (a) & (b) **(d)** None of these

61. With the rise of temperature, the velocity of sound is:

(a) Increased **(b)** Decreased

(c) Remains constant **(d)** Becomes zero

62. The magnitude of auditory sensation produced by sound on the ear is known as:

(a) Loudness **(b)** Quality

(c) Intensity **(d)** Frequency

63. The loudness of sound L is proportional to the logarithm of intensity I_0 which is called:

(a) Newton formula for sound **(b)** Laplace formula for sound

(c) Weber-Fechner's law **(d)** None of these

64. The pitch of the sound is determined by its:

(a) Speed **(b)** Frequency

(c) Direction **(d)** Number of beats

65. The amplitude of sound waves determined by its:

(a) Speed **(b)** Frequency

(c) Direction **(d)** Number of beats

66. The amplitude of sound waves determines its:

(a) Pitch **(b)** Loudness

(c) Interference **(d)** None of the above

67. What is the approximate range of audible frequencies for a young person:

(a) 2 Hz to 2000 Hz **(b)** 20 Hz to 2000 Hz

(c) 20 Hz to 20,000 Hz **(d)** 200 Hz to 2 Hz

68. The unit of intensity level is:

(a) Watt **(b)** Joule

(c) Bel **(d)** None of these

69. Sound of frequencies lower than 20 Hz are called:

(a) Supersonics **(b)** Infrasonics

(c) Ultrasonics **(d)** Audible sound waves

70. Beats are the result of:

(a) Interference **(b)** Diffraction of sound waves

(c) Polarization **(d)** None of the above

71. Musical sound depends upon:

(a) Velocity **(b)** Frequency

(c) Amplitude **(d)** Periodicity and regularity

72. Quality of sound depends upon its:

(a) Amplitude **(b)** Frequency

(c) Harmonics **(d)** Intensity of sound

73. The pitch of sound depends upon:

(a) Loudness of sound **(b)** Wavelength of sound

(c) Intensity of sound **(d)** Frequency of sound

74. Loudness of sound depends upon:

(a) Frequency **(b)** Pitch

(c) Intensity of sound & ear **(d)** Ear alone

75. The number of beats produced per second is equal to:

(a) The difference of frequencies of two tuning forks

(b) The sum of the frequencies of two tuning forks

(c) The ratio of the frequencies of two tuning forks

(d) None of these

76. Two tuning forks of frequencies 260 Hz and 257 Hz are sounded together, the number of beats per second is:

(a) 3 **(b)** 4

(c) 2 **(d)** Zero

77. The apparent change in frequency as heard by an observer when there is relative motion between the source and observer is known as:

(a) Compton effect **(b)** Photo electric effect

(c) Doppler effect **(d)** None of these

78. Radar system is the application of:

(a) Photoelectric effect **(b)** Doppler effect

(c) Compton effect **(d)** None of these

79. Doppler's effect applies to:

(a) Light waves only **(b)** Sound waves only

(c) Both sound and light waves **(d)** None of these

80. When Doppler's effect is applied to electromagnetic waves source approaching the observer at rest represents:

(a) Identical situations **(b)** Different situations

(c) No change **(d)** None of these

81. When source of sound approaches the listener at rest, the frequency of sound received by him is:

(a) Less than the frequency of sound produced by source

(b) Greater than the frequency of sound produced by source

(c) Same as that produced by source

(d) Zero

82. When the source of sound moves away from a stationary listener, then there is:

(a) An apparent increase in frequency **(b)** An apparent decrease in frequency

(c) An apparent decrease in wavelength **(d)** No apparent change in frequency

83. When a listener is moving with velocity u_o towards the stationary source of sound of frequency f the speed of sound in air is v then changed frequency of the sound is given by:

(a) $f' = \frac{v}{v + u_o} f$ **(b)** $f' = \frac{v}{v - u_o} f$

(c) $f' = \frac{v - u_o}{v} f$ **(d)** $f' = \frac{v + u_o}{v} f$

84. When a listener is moving away with velocity u_o from the stationary source of sound of frequency f the speed of sound in air is v then the changed frequency of sound is given by:

(a) $f' = \frac{v + u_o}{v} f$ **(b)** $f' = \frac{v - u_o}{v} f$

(c) $f' = \frac{v}{v + u_o} f$ **(d)** $f' = \frac{v}{v - u_o} f$

85. A source of waves which gives out pure note means that it gives out:

(a) Mixture of frequency **(b)** Quantum frequencies

(c) Single frequency **(d)** None of these

86. When the difference between the frequencies of two sounds is more than about ————. Then it becomes difficult to recognize beats:

(a) 15 Hz **(b)** 10 Hz

(c) 5 Hz **(d)** 20 Hz

87. Dog hears sound which ranges:

(a) 150 – 150000 Hz **(b)** 100 – 12000 Hz

(c) 50 – 70000 Hz **(d)** 15 – 50000 Hz

88. Cat hears sound which ranges:

(a) 60 – 7000 Hz **(b)** 60 – 70000 Hz

(c) 15 – 50000 Hz **(d)** 150 – 150000 Hz

89. Speed of sound in hydrogen at 20°C at STP is:

(a) 332 m/s **(b)** 280 m/s

(c) 258 m/s **(d)** 333 m/s

90. Speed of sound in iron at 20°C is:

(a) 5130 m/s **(b)** 5230 m/s

(c) 5030 m/s **(d)** 3600 m/s

91. The distance between a node and antinode:

(a) λ **(b)** $\frac{\lambda}{2}$

(c) $\frac{\lambda}{4}$ **(d)** $\frac{3\lambda}{2}$

92. The speed of sound in air at 30°C is approximately equal to:

(a) 333 m/s **(b)** 350 m/s

(c) 340 m/s **(d)** 335 m/s

93. The speed of sound in air at S.T.P is 300 ms^{-1}. If the air pressure becomes double, the temperature remaining the same, the speed of sound would become:

(a) 1200 ms^{-1} **(b)** 600 ms^{-1}

(c) $300\sqrt{2}$ ms^{-1} **(d)** 300 ms^{-1}

94. If the number of loops of a stationary waves are increasing then:

(a) Wavelengths gets higher **(b)** Wavelengths gets shorter

(c) Wavelength becomes constant **(d)** None of these

95. Two pipes one is open and other is closed at one end are of same length then the ratio of their fundamental frequencies is:

(a) 1 : 2 **(b)** 2 : 1

(c) 1 : 1 **(d)** 1 : 4

96. The frequency of a stretched wire 1000 mm long is 256 Hz. When the wire is shortened to 400 mm at the same tension. What is the fundamental frequency?

(a) 102 Hz **(b)** 640 Hz

(c) 416 Hz **(d)** 162 Hz

97. The quantities which together determine the speed of sound in a liquid are:

(a) the bulk Modulus and the density **(b)** the bulk Modulus and the pressure

(c) the Young Modulus and the volume **(d)** the Young Modulus and the density

98. An organ pipe of effective length 0.68 m is closed at one end. Given that the speed of sound is 340 ms^{-1}. The two lowest Resonant frequencies are:

(a) 125 Hz and 250 Hz **(b)** 125 Hz and 375 Hz

(c) 250 Hz and 500 Hz **(d)** 250 Hz and 750 Hz

99. Two sources of sound have frequencies f_1 and f_2 respectively f_1 being slightly greater then f_2. What is the period of the beats heard when the sources operate simultaneously?

(a) $f_1 - f_2$ **(b)** $\frac{1}{f_1 - f_2}$

(c) $\frac{2}{f_1 - f_2}$ **(d)** $\frac{2\pi}{f_1 - f_2}$

100. When temperature increases, frequency of organ pipe:

(a) Decreases **(b)** Increases

(c) Unchanged **(d)** Becomes zero

101. The temperature at which the speed of sound in air becomes double its value at 0°C is:

(a) 1092°C **(b)** 819 K

(c) 819°C **(d)** 546°C

102. The distance between two consecutive antinodes is 0.50 m. The distance travelled by the wave in half the time period is:

(a) 2 m **(b)** 1 m

(c) 0.5 m **(d)** 0.25 m

103. It is possible to distinguish between transverse and longitudinal waves from the property of:

(a) Refraction **(b)** Interference

(c) Diffraction **(d)** Polarization

104. The wavelength of the fundamental mode of vibration of a closed end pipe is:

(a) $2l$ **(b)** l

(c) $4l$ **(d)** $l/2$

105. Stationary waves only of discrete set of frequencies are set up in a medium. This fact is called:

(a) Harmonics **(b)** Overtones

(c) Quantization of frequencies **(d)** Superposition of frequencies

106. Newton calculated the velocity of sound in air at S.T.P equal to:

(a) 280 ms^{-1} **(b)** 250 ms^{-1}

(c) 300 ms^{-1} **(d)** 322 ms^{-1}

107. Velocity of sound in vacuum at 0°C is:

(a) 332 ms^{-1} **(b)** 320 ms^{-1}

(c) Zero **(d)** 224 ms^{-1}

108. The magnitude of auditory sensation produced by sound on the ear is known as:

(a) Frequency **(b)** Intensity

(c) Quality **(d)** Loudness

109. If 20 waves pass through the medium in 1 second with speed of 20 ms^{-1} then the wavelength is:

(a) 20 m **(b)** 2 m

(c) 400 m **(d)** 1 m

110. The number of nodes between two consecutive antinodes is:

(a) Zero **(b)** 3

(c) 2 **(d)** 1

111. The system followed by Newton for the determination of speed of sound in air is:

(a) Adiabatic **(b)** Isothermal

(c) Isobaric **(d)** Isochoric

112. Stars moving towards the Earth show a:

(a) Red shift **(b)** Blue shift

(c) Yellow shift **(d)** Green shift

113. When two notes of frequencies f_1 and f_2 are sounded together, beats are formed if $f_1 > f_2$ then the frequency of beat is:

(a) $f_1 + f_2$ **(b)** $\frac{1}{2}(f_1 + f_2)$

(c) $f_1 - f_2$ **(d)** $\frac{1}{2}(f_1 - f_2)$

114. The speed of sound at 30° c is approximately equal to:

(a) 332 ms^{-1} **(b)** 335 ms^{-1}

(c) 340 ms^{-1} **(d)** 350 ms^{-1}

115. An air column in a pipe, which is closed at one end, will be in resonance with a vibrating tuning fork of frequency 250 Hz. The length of the column in cm is (Velocity of sound in air = 340 ms^{-1})

(a) 21.25 **(b)** 125

(c) 62.50 **(d)** 33.2

116. The minimum length of a closed pipe which can resound with a note of wavelength 1 m is:

(a) 0.25 m **(b)** 0.5 m

(c) 0.75 m **(d)** 1 m

117. A particle executes S.H.M. with a period of 6 s and amplitude of 3 cm. Its maximum speed in cm/s is:

(a) $\frac{\pi}{2}$ **(b)** π

(c) 2π **(d)** 3π

118. The end correction of a resonance column is 1 cm. If the shortest length resonating with a tunning fork is 15 cm, then the next resonating length is:

(a) 45 cm **(b)** 31 cm

(c) 46 cm **(d)** 47 cm

119. The ratio of the velocity of sound in air at 4 atmosphere and that at 1 atmosphere pressure would be:

(a) 1 : 1 **(b)** 4 : 1

(c) 1 : 4 **(d)** 3 : 1

120. A string of length l, fixed at both ends is vibrating in two segments. The wavelength of the corresponding wave is:

(a) $\frac{l}{4}$ **(b)** $\frac{l}{2}$

(c) l **(d)** $2l$

121. The frequency of waves produced to microwave oven is:

(a) 1435 MHz **(b)** 2450 MHz

(c) 1860 MHz **(d)** 2850 MHz

ANSWERS

1.	(a)	**2.**	(a)	**3.**	(b)	**4.**	(a)
5.	(c)	**6.**	(c)	**7.**	(c)	**8.**	(a)
9.	(a)	**10.**	(b)	**11.**	(d)	**12.**	(b)
13.	(d)	**14.**	(b)	**15.**	(a)	**16.**	(c)
17.	(a)	**18.**	(c)	**19.**	(a)	**20.**	(c)
21.	(c)	**22.**	(c)	**23.**	(b)	**24.**	(a)
25.	(c)	**26.**	(b)	**27.**	(a)	**28.**	(c)
29.	(b)	**30.**	(d)	**31.**	(c)	**32.**	(a)
33.	(a)	**34.**	(a)	**35.**	(a)	**36.**	(b)
37.	(b)	**38.**	(a)	**39.**	(a)	**40.**	(a)
41.	(d)	**42.**	(a)	**43.**	(a)	**44.**	(a)
45.	(a)	**46.**	(a)	**47.**	(d)	**48.**	(a)
49.	(a)	**50.**	(b)	**51.**	(b)	**52.**	(b)
53.	(b)	**54.**	(c)	**55.**	(d)	**56.**	(c)
57.	(d)	**58.**	(d)	**59.**	(d)	**60.**	(b)
61.	(a)	**62.**	(a)	**63.**	(c)	**64.**	(c)
65.	(c)	**66.**	(c)	**67.**	(c)	**68.**	(c)
69.	(b)	**70.**	(a)	**71.**	(d)	**72.**	(c)
73.	(d)	**74.**	(c)	**75.**	(a)	**76.**	(a)
77.	(c)	**78.**	(b)	**79.**	(c)	**80.**	(a)
81.	(b)	**82.**	(b)	**83.**	(d)	**84.**	(b)
85.	(c)	**86.**	(b)	**87.**	(d)	**88.**	(b)
89.	(c)	**90.**	(a)	**91.**	(c)	**92.**	(b)
93.	(d)	**94.**	(b)	**95.**	(b)	**96.**	(b)
97.	(a)	**98.**	(b)	**99.**	(b)	**100.**	(a)
101.	(c)	**102.**	(c)	**103.**	(d)	**104.**	(c)
105.	(c)	**106.**	(a)	**107.**	(c)	**108.**	(d)
109.	(d)	**110.**	(d)	**111.**	(d)	**112.**	(d)
113.	(b)	**114.**	(d)	**115.**	(d)	**116.**	(c)
117.	(c)	**118.**	(d)	**119.**	(a)	**120.**	(c)
121.	(b)						