# NEET : CHAPTER WISE TEST-14

**SUBJECT :- PHYSICS** **DATE.........................................................**
**CLASS :- 11th** **NAME.........................................................**
**CHAPTER :- MECHANICAL WAVES** **SECTION.....................................................**

## (SECTION-A)

**1.** Transverse waves can propagate -
(A) Neither in solids nor in gases
(B) Only in gases
(C) Only in solids
(D) Both in solids and gases

**2.** Equation of a progressive sound wave is $y = a \sin\left(400\,\pi\, t - \frac{\pi x}{0.85}\right)$ where x in (metre), t (second), then frequency of wave is :
(A) 200 Hz (B) 400 Hz
(C) 500 Hz (D) 600 Hz

**3.** The equation of a progressive wave is $y = 0.02 \sin 2\pi\left[\frac{t}{0.01} - \frac{x}{0.3}\right]$, where x and y are in meters and t is in second. The velocity of propagation of the wave is -
(A) 400 (B) 40
(C) 300 (D) 30

**4.** The frequency of a man's voice is 300 Hz and its wavelength is 1 meter. If the wavelength of a child's voice is 1.5 m, then the frequency of the child's voice is:
(A) 200 Hz (B) 150 Hz
(C) 400 Hz (D) 350 Hz.

**5.** In a sinusoidal wave, the time required for a particular point to move from maximum displacement to zero displacement is 0.17 sec. The frequency of the wave is -
(A) 1.47 Hz (B) 0.36 Hz
(C) 0.73 Hz (D) 2.94 Hz

**6.** The equation of a wave is given by $y = a \sin\left(100t - \frac{x}{10}\right)$, where x and y are in metre and t in second; then velocity of wave is :
(A) 0.1 m/s (B) 10 m/s
(C) 100 m/s (D) 1000 m/s

**7.** An earthquake generates both transvere (S) and longitudinal (P) sound waves in the earth . The speed of S waves is about 4.5 km/s and that of P waves is about 8.0 km/s. A seismograph records P and S waves from an earthquake. The first P was arrives 4.0 min before the first S wave. The epicenter of the earthquake is located at a distance about
(A) 25 km (B) 250 km
(C) 2500 km (D) 5000 km

**8.** The equation of a sound wave is y = 0.0015 sin (62.8x + 316t). Find the wavelength of this wave-
(A) 0.2 unit
(B) 0.1 unit
(C) 0.3 unit
(D) cannot be calculated

**9.** A transverse wave is represented by the equation $y = y_0 \sin \frac{2\pi}{\lambda}(vt - x)$. For what value of $\lambda$ is the maximum particle velocity equal to two times the wave velocity -
(A) $\lambda = 2\pi y_0$ (B) $\lambda = \frac{\pi y_0}{3}$
(C) $\lambda = \frac{\pi y_0}{2}$ (D) $\lambda = \pi y_0$

**10.** At which temperature the speed of sound will be three times of its speed at 0°C ?
(A) 1100°C (B) 1284°C
(C) 1500°C (D) 2184°C

**11.** A wave is represented by $y = 3 \sin 2\pi\left(\frac{t}{0.04} - \frac{X}{0.01}\right)$ cm. The frequency of the wave and the maximum acceleration under this frequency are -
(A) 25 Hz, $7.5 \times 10^4$ cm/s$^2$
(B) 100 Hz, $4.7 \times 10^3$ cm/s$^2$
(C) 50 Hz, $7.5 \times 10^3$ cm/s$^2$
(D) 25 Hz, $4.7 \times 10^4$ cm/s$^2$

**12.** When temperature increases, the frequency of a tuning fork :
(A) increases
(B) decreases
(C) remain same
(D) increases or decreases depending on the material

**13.** Water wave are -
(A) Transverse
(B) Longitudinal
(C) Sometimes longitudinal some time transverse
(D) Neither transverse nor longitudinal

**14.** Two monoatomic ideal gases 1 and 2 of molecular masses $m_1$ and $m_2$ respectively are enclosed in separate containers kept at the same temperature. The ratio of the speed of sound in gas 1 to that in gas 2 is given by

(A) $\sqrt{\frac{m_1}{m_2}}$ (B) $\sqrt{\frac{m_2}{m_1}}$

(C) $\frac{m_1}{m_2}$ (D) $\frac{m_2}{m_1}$

**15.** On increasing the temperature by 1°C of sound, its velocity increases by :

(A) 0.6 m/s (B) 1.2 m/s

(C) 4 m/s (D) 0

**16.** The displacement represented by y (x, t) = a cos (kx + ωt) represents-

(A) Transverse wave propagating in + x direction.

(B) Transverse wave propagating in – x direction.

(C) Longitudinal wave propagating in + x direction.

(D) Longitudinal wave propagating in – x direction.

**17.** When two waves with same frequency and constant phase difference interfere,

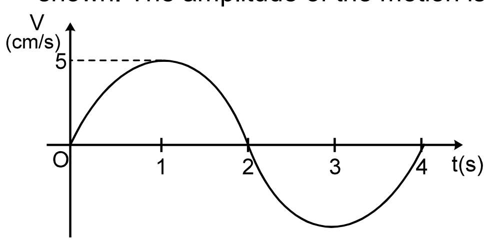
(A) there is a gain of energy

(B) there is a loss of energy

(C) the energy is redistributed and the distribution changes with time

(D) the energy is redistributed and the distribution remains constant in time

**18.** A certain transverse sinusoidal wave of wavelength 20 cm is moving in the positive x direction. The transverse velocity of the particle at x = 0 as a function of time is shown. The amplitude of the motion is :




(A) $\frac{5}{\pi}$ cm (B) $\frac{\pi}{2}$ cm

(C) $\frac{10}{\pi}$ cm (D) 2π cm

**19.** A sound absorber attenuates the sound level by 20 dB. The intensity decreases by a factor of :

(A) 1000 (B) 10000

(C) 10 (D) 100

**20.** The waves in which the particles of the medium vibrated in a direction perpendicular to the direction of wave motion is known as -

(A) Transverse wave

(B) Longitude waves

(C) Propagated waves

(D) None of these

**21.** A sinusoidal wave with amplitude $y_m$ is travelling with speed V on a string with linear density ρ. The angular frequency of the wave is ω. The following conclusions are drawn. Mark the one which is correct.

(A) doubling the frequency doubles the rate at which energy is carried along the string

(B) if the amplitude were doubled, the rate at which energy is carried would be halved

(C) if the amplitude were doubled, the rate at which energy is carried would be doubled

(D) the rate at which energy is carried is directly proportional to the velocity of the wave.

**22.** Two waves represented as $y_1$ = a sin $\left(\omega t + \frac{\pi}{6}\right)$, $y_2$ = a cos ωt the resultant amplitude is -

(A) a (B) $a\sqrt{2}$

(C) $a\sqrt{3}$ (D) 2a

**23.** When a sound wave is reflected from a wall, the phase difference between the reflected and incident pressure wave is:

(A) 0 (B) π (C) π/2 (D) π/4

**24.** When two waves of the same amplitude and frequency but having a phase difference of φ, travelling with the same speed in the same direction (positive x), interfere, then

(A) their resultant amplitude will be twice that of a single wave but the frequency will be same

(B) their resultant amplitude and frequency will both be twice that of a single wave

(C) their resultant amplitude will depend on the phase angle while the frequency will be the same

(D) the frequency and amplitude of the resultant wave will depend upon the phase angle.

**25.** To hear the echo in 1 second, the minimum distance of the source from the reflecting surface should be:

(A) 28 m (B) 18 m
(C) 19 m (D) 165 m

**26.** An observer standing at the sea-coast observes 54 waves reaching the coast per minute. If the wavelength of wave is 10m, The velocity. of wave is

(A) 19 m/sec (B) 29 m/sec
(C) 9 m/sec (D) 39 m/sec

**27.** A sound wave of frequency 660 Hz is incident normally at reflecting wall then minimum distance from wall at which particle's pressure amplitude will be maximum
(velocity of sound = 330 m/s) :

(A) 0.215 m (B) 0.125 m
(C) 1 m (D) 0.25 m

**28.** The wave–function for a certain standing wave on a string fixed at both ends is y(x,t) = 0.5 sin ($0.025\pi x$) cos500 t where x and y are in centimeters and t is in seconds. The shortest possible length of the string is :

(A) 126 cm (B) 160 cm
(C) 40 cm (D) 80 cm

**29.** If $\lambda_1$, $\lambda_2$, $\lambda_3$ are the wavelengths of the waves giving resonance in the fundamental, first and second overtone modes respectively in a open organ pipe, then the ratio of the wavelengths $\lambda_1 : \lambda_2 : \lambda_3$, is :

(A) 1 : 2 : 3 (B) 1 : 3 : 5
(C) 1 : 1/2 : 1/3 (D) 1 : 1/3 : 1/5

**30.** If vibrations of a string are to be increased by a factor two, then tension in the string must be made

(A) Half (B) Twice
(C) Four times (D) Eight times

**31.** A cylindrical tube, open at both ends, has a fundamental frequency $\upsilon$. The tube is dipped vertically in water so that half of its length is inside the water. The new fundamental frequency is

(A) $\upsilon/4$ (B) $\upsilon/2$ (C) $\upsilon$ (D) $2\upsilon$

**32.** Two waves of same frequency and of intensity $I_0$ and $9I_0$ produces interference. If at a certain point the resultant intensity is $7I_0$ then the minimum phase difference between the two sound waves will be -

(A) 90° (B) 100°
(C) 120° (D) 110°

**33.** Minimum resonating length of a closed organ pipe is 50 cm, when it is vibrated by same frequency, then next resonating length will be :

(A) 250 cm (B) 200 cm
(C) 150 cm (D) 100 cm

**34.** The wire of a sonometer has a length of 1 m and mass $5 \times 10^{-4}$ kg. If has a tension of 20N. IF the wire is pulled at a point 25 cm away from one end and released, the frequency of its vibrations will be -

(A) 200 Hz (B) 150 Hz
(C) 250 Hz (D) 100 Hz

**35.** An organ pipe open at both ends contains

(A) longitudinal stationary waves
(B) longitudinal progressive waves
(C) transverse stationary waves
(D) transverse progressive waves

## (SECTION-B)

**36.** The equation of a wave travelling in a string can be written as y = 3 cos $\pi$ (100 t – x). Its wavelength is -

(A) 100 cm (B) 2 cm
(C) 5 cm (D) None of these

**37.** A closed organ pipe and an open organ pipe are turned to the same fundamental frequency. What is the ratio of their lengths ?

(A) 1 : 2 (B) 2 : 1
(C) 2 : 3 (D) 4 : 3

**38.** Two waves of intensities ratio are 9 : 1 then the ratio of their resultant's maximum and minimum intensities will be :

(A) 10 : 8 (B) 7 : 2
(C) 4 : 1 (D) 2 : 1

**39.** 16 tuning forks are arranged in the order of increasing frequencies. Any two successive forks give 8 beats per sec when sounded together. If the last fork gives the octave of the first, then the frequency of the first fork is-

(A) n = 120 (B) n = 160
(C) n = 180 (D) n = 220

**40.** A standing wave having 3 nodes and 2 antinodes is formed between two atoms having a distance of 1.21 Å between them. The wavelength of the standing wave is -

(A) 1.21 Å (B) 2.42 Å
(C) 3.63 Å (D) 6.05 Å

**41.** A tuning fork of frequency 512 Hz is vibrated with a sonometer wire and 6 beats per second are heard. The beat frequency reduces if the tension in the string is slightly increased. The original frequency of vibration of the string is

(A) 506 Hz (B) 512 Hz
(C) 518 Hz (D) 524 Hz

**42.** The ends of a stretched wire of length L are fixed at $x = 0$ & $x = L$ . In one experiment the displacement of the wire is $y_1 = A \sin (\pi x/L) \sin \omega t$ & energy is $E_1$ and in other experiment its displacement is $y_2 = A \sin (2 \pi x/L) \sin 2 \omega t$ and energy is $E_2$ . Then :

(A) $E_2 = E_1$ (B) $E_2 = 2 E_1$
(C) $E_2 = 4 E_1$ (D) $E_2 = 16 E_1$

**43.** A closed organ pipe and an open pipe of same length produce 4 beats when they are set into vibrations simultaneously. If the length of each of them were twice their initial lengths, the number of beats produced will be [Assume same mode of vibration in both cases]

(A) 2 (B) 4 (C) 1 (D) 8

**44.** When the length of the vibrating segment of a sonometer wire is increased by 1%, the percentage change in its frequency is -

(A) 1 (B) 2
(C) 1.5 (D) 0.9

**45.** Two waves of lengths 50 cm and 51 cm produced 12 beats per second.The velocity of sound is-

(A) 306 m/s (B) 331 m/s
(C) 340 m/s (D) 360 m/s

**46.** Standing waves are produced in 10 m long stretched string. If the string vibrates in 5 segments and wave velocity is 20 m/s, its frequency is

(A) 5 Hz (B) 4 Hz
(C) 2 Hz (D) 10 Hz

**47.** To obtain beats, the maximum difference in the frequencies of two sources is :

(A) 4 Hz (B) 10 Hz
(C) 20 Hz (D) 50 Hz

**48.** **Assertion** : In transverse wave particle velocity is perpendicular to the direction of wave velocity.

**Reason :** In wave motion energy always transfered in the direction of wave propagation.

(A) If both assertion and reason are true and reason is the correct explanation of assertion.
(B) If both assertion and reason are true but reason is not the correct explanation of assertion.
(C) If Assertion is true but reason is false.
(D) If both assertion and reason are false.

**49.** Equation of travelling wave on a stretched string of linear density 5 g/m is $y = 0.03 \sin (450\ t - 9x)$ where distance and time are measured in SI units. The tension in the string is :

(A) 12.5 N (B) 7.5 N
(C) 10 N (D) 5 N

**50.** Match the column I with column II

**Column I**
(a) Sound waves
(b) Points on a sphere formed by point source
(c) Simple harmonic functions
(d) Quality of sound

**Column II**
(p) Pressure variation in elastic medium
(q) Longitudinal
(r) Same phase
(s) Sine waves

(A) a→q, p, b→r, c→s, d→p
(B) a→p, b→p, r, c→q, d→s
(C) a→p, b→r, s, c→q, d→p
(D) a→r, b→q, s, c→r, d→p