PHYSICS

NEET

CRASH COURSE

MECHANICAL WAVES

SMART ACHIEVERS

JEE | NEET | FOUNDATION

MECHANICAL WAVES

Q.1 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:
(1) 200 Hz   (2) 150 Hz   (3) 400 Hz   (4) 350 Hz.

Q.2 When two waves with same frequency and constant phase difference interfere,
(1) there is a gain of energy
(2) there is a loss of energy
(3) the energy is redistributed and the distribution changes with time
(4) the energy is redistributed and the distribution remains constant in time

Q.3 Sound signal is sent through a composite tube as shown in the figure. The radius of the semicircular portion of the tube is r. Speed of sound in air is v. The source of sound is capable of giving varied frequencies in the range of v_1 and v_2 (where $v_2 > v_1$). If n is an integer then frequency for maximum intensity is given by :
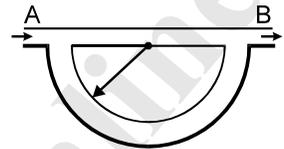
(1) $\dfrac{nv}{r}$ (2) $\dfrac{nv}{r(\pi - 2)}$ (3) $\dfrac{nv}{\pi r}$ (4) $\dfrac{nv}{(r-2)\pi}$

Q.4 When a sound wave is reflected from a wall, the phase difference between the reflected and incident pressure wave is:
(1) 0   (2) π (3) $\pi/2$ (4) $\pi/4$

Q.5 An interference is observed due to two coherent sources 'A' & 'B' separated by a distance 4λ along the y–axis where λ is the wavelength of the source. A detector D is moved on the positive x–axis. The number of points on the x–axis excluding the points, x = 0 & x = ∞ at which maximum will be observed is -

(1) three   (2) four
(3) two   (4) infinite
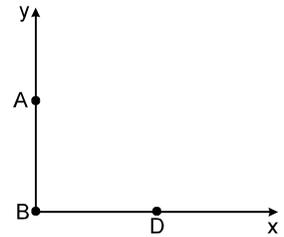
Q.6 If $\lambda_1, \lambda_2, \lambda_3$ are the wavelengths of the waves giving resonance in the fundamental, first and second overtone modes respectively in a open organ pipe, then the ratio of the wavelengths $\lambda_1 : \lambda_2 : \lambda_3$, is :
(1) $1 : 2 : 3$ (2) $1 : 3 : 5$ (3) $1 : 1/2 : 1/3$ (4) $1 : 1/3 : 1/5$

Q.7 The fundamental frequency of a closed organ pipe is same as the first overtone frequency of an open pipe. If the length of open pipe is 50 cm, the length of closed pipe is
(1) 25 cm   (2) 12.5 cm   (3) 100 cm   (4) 200 cm

Q.8 A tube of diameter d and of length $2\overline{)21}$ unit is open at both ends. Its fundamental frequency of resonance is found to be v_1. The velocity of sound in air is 330 m/sec. One end of tube is now closed. The lowest frequency of resonance of tube is v_2.
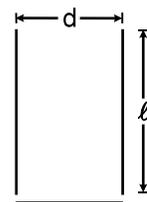
Taking into consideration the end correction, $\dfrac{v_2}{v_1}$ is

(1) $\dfrac{(\lambda + 0.6d)}{(\lambda + 0.3d)}$ (2) $\dfrac{1}{2}\dfrac{(\lambda + 0.3d)}{(\lambda + 0.6d)}$ (3) $\dfrac{1}{2}\dfrac{(\lambda + 0.6d)}{(\lambda + 0.3d)}$ (4) $\dfrac{1}{2}\dfrac{(d + 0.3\lambda)}{(d + 0.6\lambda)}$

Q.9 If two tuning forks A & B give 4 beats/sec. with each other, on loading A with wax, 2 beats/sec. are given. If frequency of A is 256 Hz, then frequency of B is -
(1) 250 Hz (2) 252 Hz (3) 260 Hz (4) 262 Hz

Q.10 The frequency of a fork A is 3% more than the frequency of a standard fork whereas the frequency of fork B is 3% less. The forks A and B produce 6 beats per second. The frequency of stadard fork will be
(1) 100 Hz (2) 106 Hz (3) 103 Hz (4) 112 Hz

Q.11 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]
(1) 2 (2) 4 (3) 1 (4) 8

Q.12 An engine driver moving towards a wall with velocity of 50 ms^{-1} emits a note of frequency 1.2 kHz. The frequency of note after reflection from the wall as heard by the engine driver when speed of sound in air is 350 ms^{-1} is :
(1) 1 kHz (2) 1.8 kHz
(3) 1.6 kH (4) 1.2 kHz
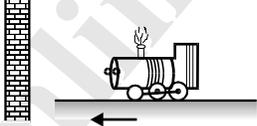
Q.13 Two trains move towards each other with the same speed. Speed of sound is 340 ms^{-1}. If the pitch of the tone of the whistle of one when heard on the other changes by 9/8 times, then the speed of each train is :
(1) 2 ms^{-1} (2) 40 ms^{-1} (3) 20 ms^{-1} (4) 100 ms^{-1}
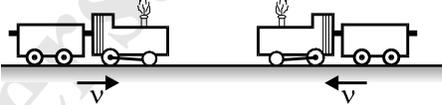
Q.14 A small source of sound moves on a circle as shown in fig. and an observer is sitting at O. Let at $\upsilon_1, \upsilon_2, \upsilon_3$ be the frequencies heard when the source is at A, B, and C respectively.
(1) $\upsilon_1 > \upsilon_2 > \upsilon_3$ (2) $\upsilon_1 = \upsilon_2 > \upsilon_3$
(3) $\upsilon_2 > \upsilon_3 > \upsilon_1$ (4) $\upsilon_1 > \upsilon_3 > \upsilon_2$
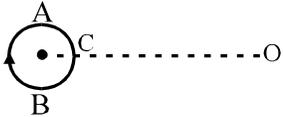
Q.15 Transverse waves can propagate -
(1) Neither in solids nor in gases (2) Only in gases
(3) Only in solids (4) Both in solids and gases

Q.16 The waves in which the particles of the medium vibrated in a direction perpendicular to the direction of wave motion is known as -
(1) Transverse wave (2) Longitude waves (3) Propagated waves (4) None of these

Q.17 A medium can carry a longitudinal wave because it has the property of-
(1) Mass (2) Density (3) Compressibility (4) Elasticity

Q.18 Equation of progressive wave is given by $y = a \sin \pi(40t - x)$ where a and x are in meter and t in second. The velocity of the wave in (m/s) is -
(1) 20 (2) 40 (3) 10 (4) 80

Q.19   The number of waves, contained in unit length of the medium, is called -
(1) Elastic wave   (2) Wave number   (3) Wave pulse   (4) Electromagnetic wave

Q.20   A wave shown by the equation $y = a \sin(\omega t + \phi)$ is totally reflected by a light medium, then the following will change -
(1) Amplitude (a)   (2) Angular frequency (ω)
(3) Phase (ϕ)   (4) Frequency and phase

Q.21   The equation of a progressive wave is $y = 10 \sin \pi (0.01x - 2t)$ cm., the value of frequency in Hz. will be -
(1) 2π (2) π (3) 2   (4) 1

Q.22   The equation of displacement of two waves are given as
$y_1 = 10 \sin(3\pi t + \pi/3)$
$y_2 = 5 (\sin 3\pi t + \sqrt{3} \cos 3\pi t)$, then what is the ratio of their amplitude -
(1) 1 : 2   (2) 2 : 1   (3) 1 : 1   (4) None of these

Q.23   The displacement equations for two waves undergoing super position are respectively $y_1 = 4 \sin \omega t$ and $y_2 = 3 \sin(\omega t + \pi/2)$ the amplitude of the resultant wave is -
(1) 5   (2) 7   (3) 1   (4) 0

Q.24   Four wires of identical lengths, diameters and of the same material are stretched on a sonometer wire. The ratio of their tension is 1 : 4 : 9 : 16. The ratio of their fundamental frequencies is -
(1) 1 : 4 : 9 : 16   (2) 4 : 3 : 2 : 1   (3) 1 : 2 : 3 : 4   (4) 16 : 9 : 4 : 1

Q.25   If vibrations of a string are to be increased by a factor two, then tension in the string must be made
(1) Half   (2) Twice   (3) Four times   (4) Eight times

Q.26   Standing waves are produced in 10 metre long stretched string. If the string vibrates in 5 segments and wave velocity is 20 m/s, the frequency is -
(1) 2 Hz   (2) 4 Hz   (3) 5 Hz   (4) 10 Hz

Q.27   In stationary waves at nodes -
(1) Energy is maximum   (2) Pressure and change in density maximum
(3) Change in strain is maximum   (4) All of the above

Q.28   The equation of a stationary wave is $y = 0.8 \cos \left(\dfrac{\pi x}{20}\right) \sin 200 \pi t$, where x is in cm and t is in sec. The separation between consecutive nodes will be -
(1) 20 cm   (2) 10 cm   (3) 40 cm   (4) 30 cm

Q.29   In a stationary wave, all particles are -
(1) At rest at the same time twice in every period of oscillation
(2) At rest at the same time only once in a every period of oscillation
(3) Never at rest at the same time
(4) Never at rest at all

Q.30 The equation of a wave travelling in a string can be written as $y = 3 \cos \pi (100\,t - x)$. Its wavelength is-
(1) 100 cm   (2) 2 cm   (3) 5 cm   (4) None of these

Q.31 Equation $y = 2a \cos K x \sin \omega t$ represents -
(1) Progressive wave   (2) Stationary wave   (3) Light wave   (4) None of these

Q.32 Energy are not transferred in these waves -
(1) Heat waves   (2) Matter waves   (3) Transfer waves   (4) Stationary waves

Q.33 A string a musical instrument is 50 cm long and its fundamental frequency is 270 Hz. If a frequency of 1000 Hz is to be produced, then required length of string is -
(1) 13.5 cm   (2) 10.3 cm   (3) 5.4 cm   (4) 2.7 cm

Q.34 A tube closed at one end and containing air produces, when excited the fundamental note of frequency 512 Hz. If the tube is open at both ends, the fundamental frequency that can be excited is (in Hz)
(1) 1024   (2) 512   (3) 256   (4) 128

Q.35 If at a place the speed of a sound wave of frequency 300 Hz is V, the speed of another wave of frequency 150 Hz at the same place will be:
(1) V   (2) V/2   (3) 2V   (4) 4V

Q.36 The power of sound from the speaker of a radio is 20 milli.watt by turning the knob of the volume control the power of the sound is increased to 400 milliwatt. The power increase in decibles as compared to the original power is :
(1) 13 db   (2) 10 db   (3) 20 db   (4) 800 db

Q.37 A source x of unknown frequency produces 8 beats with a source of 250 Hz and 12 beats with a source of 270 Hz. The frequency of source x is :
(1) 258 Hz   (2) 242 Hz   (3) 262 Hz   (4) 282 Hz

Q.38 Two waves of wave length 2 m and 2.02 m respectively moving with the same velocity superimpose to produce 2 beats per sec. The velocity of the wave is:
(1) 400.0 m/s   (2) 402 m/s   (3) 404 m/s   (4) 406 m/s

Q.39 A string under a tension of 129.6 N produces 10 beats /sec when it is vibrated along with a tuning fork. When the tension is the string is increased to 160 N. it sounds in unison with same tuning fork. calculate fundamental freq. of tuning fork.
(1) 100 Hz   (2) 50 Hz   (3) 150 Hz   (4) 200 Hz

Q.40 The property of a medium necessary for wave propagation is -
(1) Its inertia   (2) Its elasticity   (3) Its low resistance   (4) All of above

Q.41 The relation between the particles velocity and wave velocity is -

(1) $u = -v\,\dfrac{dy}{dx}$ (2) $u = \dfrac{V}{\left(\dfrac{dy}{dx}\right)}$ (3) $u = V$ (4) $u = V + \dfrac{dy}{dx}$

Q.42 A sine wave has amplitude A and wavelength λ. If V is the wave velocity and v be the maximum particle velocity, then

(1) $V = v$ if $A = \dfrac{\lambda}{2\pi}$

(2) $V = v$ if $A = 2\pi\lambda$

(3) $V = v$ if $A = \pi\lambda$

(4) V can never be equal to v.

Q.43 If the energy density and velocity of a wave are u and c respectively then the energy propagating per second per unit area will be -

(1) uc

(2) $\dfrac{c}{u}$

(3) $\dfrac{u}{c}$

(4) $c^2 u$

Q.44 The equation of a progressive wave moving in +ve X-direction is given by -

(1) $Y = A \sin 2\pi \left(\dfrac{Vt}{\lambda} - X \right)$

(2) $Y = A \sin \dfrac{2\pi}{\lambda} \left(Vt - \dfrac{X}{\lambda} \right)$

(3) $Y = A \sin \dfrac{2\pi}{\lambda} (Vt - X)$

(4) $Y = A \sin \dfrac{2\pi}{\lambda} (X + Vt)$

Q.45 If the speed of the wave shown in the figure is 330 m/s in the given medium, then the equation of the wave propagating in the positive x-direction will be - (all quantities are in MKS units)

(1) $y = 0.05 \sin 2\pi (4000 t - 12.5 x)$

(2) $y = 0.05 \sin 2\pi (4000 t - 122.5 x)$

(3) $y = 0.05 \sin 2\pi (3300 t - 10 x)$

(4) $y = 0.05 \sin 2\pi (3300 x - 10 t)$

Q.46 The equation of a progressive wave is $y = 8 \sin \pi (.02 x - 4t)$. If the x and y are expressed in cm and time in seconds, the value of wavelength and the periodic time will be -

(1) 50cm, 25 sec

(2) 0.02 cm, 4 sec

(3) 100 cm, 0.5 sec

(4) None of these

Q.47 The equation of plane progressive wave propagating in positive X-direction is $y = a \sin 2\pi \left[n - \dfrac{x}{\lambda} \right]$. If the maximum particle velocity is three time the wave velocity then the wavelength of wave is

(1) $\dfrac{\pi a}{3}$

(2) πa

(3) $\dfrac{\pi a}{2}$

(4) $\dfrac{2\pi a}{3}$

Q.48 The equation of a progressive wave is $Y = 10 \sin 2\pi (60t + 2X)$, where X and Y are in metres and t is in seconds. It represents a wave whose velocity is

(1) 60 metre/sec in +X direction

(2) 60 metre/sec in –X direction

(3) 30 metre/sec in +X direction

(4) 30 metre/sec in –X direction

Q.49 When a sound wave of frequency 300Hz passes through a medium, the maximum displacement of a particle of the medium is 0.1 cm. The maximum velocity of the particle is equal to :
(1) 60 π cm/sec   (2) 30 π cm/sec   (3) 30 cm/sec   (4) 60 cm /sec

Q.50 If the air pressure is doubled at constant temperature, then the speed of sound will be become -
(1) Double   (2) Three times
(3) Four times   (4) Equal to its initial value

Q.51 At what temperature the speed of sound will be double of the speed at 27º C -
(1) 54º C   (2) 108º C   (3) 927º C   (4) 327º C

Q.52 In an orchestra, the musical sounds of different instruments are distinguished from one another by which of the following characteristic –
(1) Pitch   (2) Loudness   (3) Quality   (4) Overtones

Q.53 The amplitude of a wave represented by displacement equation :
$y = \dfrac{1}{\sqrt{a}} \sin \omega t \pm \dfrac{1}{\sqrt{b}} \cos \omega t$ will be -
(1) $\dfrac{a+b}{ab}$ (2) $\dfrac{\sqrt{a}+\sqrt{b}}{ab}$ (3) $\dfrac{\sqrt{a} \pm \sqrt{b}}{ab}$ (4) $\sqrt{\dfrac{a+b}{ab}}$

Q.54 The resultant amplitude, when two waves of same frequency but with amplitudes a_1 and a_2 superimpose at phase difference of $\dfrac{\pi}{2}$, will be -
(1) $a_1 + a_2$ (2) $a_1 - a_2$ (3) $\sqrt{a_1^2 + a_2^2}$ (4) $a_1^2 + a_2^2$

Q.55 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-
(1) 90º   (2) 100º   (3) 120º   (4) 110º

Q.56 If two progressive waves of amplitude A_1 and A_2 superpose, while moving in the same direction, then the amplitude of the resultant wave will be -
(1) $A_1 + A_2$ (2) $\sqrt{A_1^2 + A_2^2}$
(3) Between $A_1 + A_2$ and $A_1 - A_2$ (4) $A_1 - A_2$

Q.57 Two waves of intensities I and 4I produce interference. Then the intensity at constructive and destructive interference respectively is –
(1) 3I, 5I   (2) 5I, 3I   (3) I, 9I   (4) 9I, I

Q.58 A stationary wave is represented by -
(1) $Y = 2A \cos Kx \sin \omega t$.   (2) $Y = 2A \sin K(x - Vt) \sin \omega t$
(3) $Y = 2A \cos Kx \cos(\omega t - Kx)$ (4) $Y = 2A \cos K(X - Vt) \cos \omega t$

Q.59 The equation of a stationary wave is $Y = 10 \sin \frac{\pi x}{4} \cos 20 \pi t$. The distance between two consecutive nodes in metres is -
(1) 4   (2) 2   (3) 5   (4) 8

Q.60 In stationary wave in strings –
(1) Energy is uniformly distributed
(2) Energy is maximum at nodes and minimum at antinodes
(3) Energy is minimum at nodes and maximum at antinodes
(4) Alternating maxima and minima of energy are produced at nodes and antinodes

Q.61 A stretched string of length L, fixed at both ends can sustain stationary waves of wavelength λ given by -
(1) $\lambda = n^2 / 2L$ (2) $\lambda = L^2 / 2n$ (3) $\lambda = 2L/n$ (4) $\lambda = 2Ln$

Q.62 In open pipes, the positions of antinodes are obtained at –
(1) $0, \frac{\lambda}{2}, 2\lambda$ (2) $0, \frac{\lambda}{2}, \lambda$ (3) $\frac{\lambda}{4}, \frac{3\lambda}{4}, \lambda$ (4) $\frac{5\lambda}{4}, \frac{3\lambda}{4}$

Q.63 In closed pipes, the positions of antinodes are obtained at –
(1) $\frac{\lambda}{4}, \frac{3\lambda}{4}, \frac{5\lambda}{4}$ (2) $0, \frac{\lambda}{2}, \lambda$ (3) $\lambda, 2\lambda, 3\lambda$ (4) $2\lambda, 4\lambda, 6\lambda$

Q.64 The first overtone of a closed pipe is given by –
(1) $n_2 = \frac{V}{4\lambda}$ (2) $n_2 = \frac{3V}{4\lambda}$ (3) $n_2 = \frac{5V}{4\lambda}$ (4) $n_2 = \frac{7V}{4\lambda}$

Q.65 In an open organ pipe, if the fundamental frequency is n, the overtones produced in it are in the ratio of-
(1) 2n : 3n : 4n   (2) 2n : 4n : 8n   (3) 3n : 5n : 7n   (4) 3n : 7n : 11n

Q.66 The ratio of the lengths of two closed pipes is 31/30. Their fundamental frequencies are in ratio of –
(1) $\frac{31}{30}$ (2) $\frac{30}{31}$ (3) $\frac{60}{31}$ (4) $\frac{31}{60}$

Q.67 Two adjacent piano keys are struck simultaneously. The notes emitted by them have frequencies n_1 and n_2. The number of beats heard per sound is
(1) $(n_1 - n_2)/2$ (2) $(n_1 + n_2)/2$ (3) $n_1 - n_2$ (4) $2(n_1 - n_2)$

Q.68 Beats are produced by two waves $y_1 = a \sin 2000\pi t$ and $y_2 = a \sin 2008\pi t$. The number of beats heard per second is
(1) Zero   (2) One   (3) Four   (4) Eight

Q.69 Two waves are y = 0.25 sin 316 t and y = 0.25 sin 310 t are travelling in same direction. The number of beats produced per second will be
(1) 6 (2) 3 (3) 3 /π (4) π / 3

Q.70 A sources of sound gives 5 beats per second when sounded with another sources of frequency 100 second^{-1} . The second harmonic of the source, together with a source of frequency 205 second^{-1} gives 5 beats per second. What is the frequency of the source ?
(1) 95 second^{-1} (2) 100 second^{-1} (3) 105 second^{-1} (4) 205 second^{-1}

Q.71 Doppler's effect will be more effectively observed when the observer -
(1) is moving along line joining be the source
(2) is in motion in a direction perpendicular to the source
(3) is moving in any direction relative to the source
(4) None of the above

Q.72 Doppler's effect can be observed for -
(1) Supersonic speeds (2) Sound waves
(3) both the above (4) neither of them

Q.73 Doppler's effect will not be observed, if velocity of sound is -
(1) Less than the velocity of source (2) Less than the velocity of medium
(3) Less than the velocity of observer (4) All of the above

Q.74 Doppler's displacement doesn't depend upon -
(1) velocity of source (2) velocity of observer
(3) frequency of wave (4) Separation between source & observer

Q.75 Apparent frequency of train A is heard by observer in train B as 3/4 of the true frequency. Find the value of velocity of train B in m/sec. taking train A to be stationary. If the sound velocity is 332 m/sec. -
(1) 110 (2) 108 (3) 75 (4) 83

Q.76 Which of the following property of waves is proved by Doppler's effect -
(1) Longitudinal nature (2) Transverse nature
(3) both transverse and longitudinal nature (4) neither longitudinal nor transverse nature

Q.77 A source of sound crosses a stationary observer which is moving with uniform velocity v. If the velocity of sound in air is V, then the ratio of the apparent frequencies heard by the observer before and after the source crosses him would be -

(1) $\dfrac{V+v}{V-v}$ (2) $\dfrac{V-v}{V+v}$ (3) $\dfrac{V}{V-v}$ (4) $\dfrac{V+v}{V}$

Q.78 The correct equation of one dimensional wave is -

(1) $\dfrac{d^2y}{dx^2} = \dfrac{1}{V^2}\dfrac{d^2y}{dt^2}$ (2) $\dfrac{d^2y}{dx^2} = V^2\dfrac{d^2y}{dt^2}$ (3) $\dfrac{d^2y}{dx^2} = \dfrac{1}{V}\dfrac{d^2y}{dt^2}$ (4) $\dfrac{d^2y}{dx^2} = V\dfrac{d^2y}{dt^2}$

Q.79 In the given arrangement, if hanging mass will be changed by 4%, then percentage change in the wave speed in string will be:
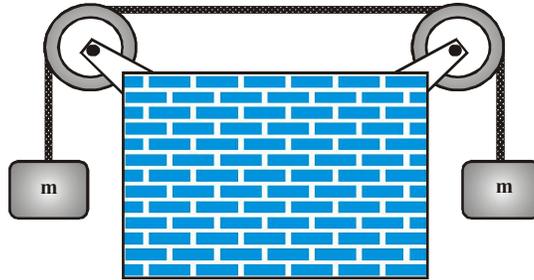
(1) 2% (2) 8% (3) 3% (4) 4%

Q.80 The temperature at which the velocity of sound in air becomes double its velocity at 0°C is
(1) 435°C (2) 694°C (3) 781°C (4) 819°C

Q.81 The phenomenon of sound propagation in air is
(1) An isothermal process (2) An adiabatic process
(3) An isobaric process (4) None of these

Q.82 Identify the figure, which correctly represent the given wave function at $t = 0$?

$$y = 2\sqrt{3} \sin \pi(2x - 3t)$$

(1)

(2)

(3)

(4)

Q.83 The frequencies of sources A and B as shown in figure are same. The nature of interference at points P, Q and R will be if $AB = \dfrac{\lambda}{2}$ and the two sources are in same phase.
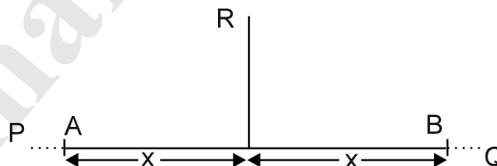
(1) constructive at P. destructive at Q and R.
(2) constructive at P and R. destructive at Q.
(3) constructive at P and Q. destructive at R.
(4) constructive at R. destructive at P and Q

Q.84 Disturbances of two waves are shown as a function of time in the following figure. The ratio of their intensities will be -
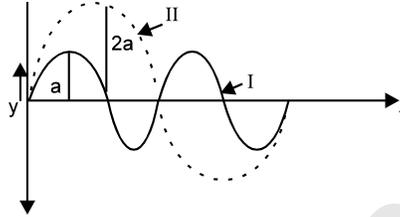
(1) 1 : 4   (2) 4 : 1   (3) 1 : 2   (4) 1 : 1

Q.85 At a moment in a progressive wave, the phase of a particle executing S.H.M. is $\frac{\pi}{3}$. Then the phase of the particle 15 cm ahead and at the time $\frac{T}{2}$ will be, if the wavelength is 60 cm

(1) $\frac{\pi}{2}$ (2) $\frac{2\pi}{3}$ (3) zero   (4) $\frac{5\pi}{6}$

Q.86 In stationary waves, energy is –
(1) transferred
(2) not transferred
(3) zero at every point
(4) transferred in the direction of propagation of waves.

Q.87 In a stretched string under tension and fixed at both ends, the tension is increased by four times, and the length is doubled, the frequency -
(1) Becomes half   (2) Remains the same
(3) Becomes twice   (4) Becomes four times

Q.88 The total mass of a sonometer wire remains constant. On increasing the distance between two bridges to four times, its frequency will become -
(1) 4 times   (2) 1/2 times   (3) 8 times   (4) $\sqrt{2}$ times

Q.89 Air is blown on the mouth of a tube of length 25 cm and diameter 2 cm. The tube is open at both the ends . The velocity of sound is 330 m/s. Then sound which is produced will correspond to frequencies
(1) 660 Hz, 1320 Hz, 1980 Hz   (2) 330 Hz , 990 Hz, 1650 Hz
(3) 330 Hz, 660 Hz , 990 Hz   (4) All of the above

Q.90 When tension in a string is 225N, then vibrating in fundamental mode it produces 6 beats per second with a tuning fork. The same string, when under tension of 256 N, again vibtrating in fundamental mode produces with the same tuning fork 6 beats/sec. Then the frequency of the tuning fork is –
(1) 256Hz   (2) 225Hz   (3) 240Hz   (4) 186Hz

Q.91 A sonometer wire is 31cm long is in resonance with a tuning fork of frequency n. If the length is increased by 1cm and it is vibrated with the same tuning fork, then 8 beats/sec are heard. The frequency of the tuning fork is –
(1) 248Hz   (2) 256Hz   (3) 264Hz   (4) None of the above

Q.92 The velocity of light emitted by a source S and observed by an observer O who is at rest with respect to S is c. If the observer moves towards S with velocity v the velocity of light as observed will be -

(1) $c - v$ (2) $c + v$ (3) c (4) $\sqrt{1 - \dfrac{v^2}{c^2}}$

Q.93 The apparent change in the frequency n of the electromagnetic signal, sent from a rocket approaching the moon with velocity v (v $\ll$ c), when it is received back by the rocket driver being reflected by the moon, is -

(1) $\left(\dfrac{v}{c}\right)n$ (2) $\left(\dfrac{2v}{c}\right)n$ (3) $\left\{\left(\dfrac{c+v}{c}\right)\right\}n$ (4) $\left(\dfrac{v}{c}\right)^2 n$

Q.94 A parachutist jumps from an aeroplane which is moving horizontal with constant speed. The relation between the apparent frequency 'n' as observed by the parachutist and the frequency n of the sound of the aeroplane is -
(1) $n = n'$ (2) $n' > n$
(3) $n > n'$ (4) difficult to predict

Direction for following questions :
A. **Both Assertion and Reason are true, and Reason is the correct explanation of Assertion.**
B. **Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.**
C. **Assertion is true but Reason is false.**
D. **Assertion and Reason both are false.**

Q.95 **Assertion :** Two persons on the surface of moon cannot talk to each other.
Reason : There is no atmosphere on moon.
(1) A (2) B (3) C (4) D

Q.96 **Assertion :** In the case of a stationary wave, a person hear a loud sound at the nodes as compared to the antinodes.
Reason : In a stationary wave all the particles of the medium vibrate in phase.
(1) A (2) B (3) C (4) D

Q.97 **Assertion :** Sound waves cannot propagate through vacuum but light waves can.
Reason : Sound waves cannot be polarised but light waves can be polarised.
(1) A (2) B (3) C (4) D

Q.98 **Assertion :** In standing wave pattern particle of medium between two consecutive nodes vibrates in same phase but with different amplitude.
Reason : In stationary wave, the amplitude of vibration does not depends on the position of the particle.
(1) A (2) B (3) C (4) D

Q.99 **Assertion :** The velocity of sound in air decreaes if the pressure of air decreases at constant

temperature.

Reason : According to Laplace's formula as modified by Newton, velocity of sound in air is given by

$$V = \sqrt{\frac{\gamma P}{\rho}} \ .$$

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

Q.100 **Assertion :**   The wave function of a pulse is given by y = $\dfrac{3}{(2x+3t)^2+4}$, is propagates in (–ve)

x-direction.

Reason : The given wave function is of the form y = f(kx + ωt). which represent a wave travelling in negative X-direction.

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

Q.101 **Assertion :**   Mechanical transverse waves cannot be generated in gaseous medium.

Reason : Mechanical transverse waves can be produced only in such medium which have shearing property.

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

Q.102 **Assertion :**   Sound wave travels faster in moist air.

Reason : The density of moist air is less then density of dry air.

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

Q.103 **Assertion :** COP contain only odd harmonics.

Reason : OOP contain all odd and even harmonics.

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

Q.104 **Assertion :**   Due to end correction fundamental frequency of any pipe becomes less than frequency without end correction.

Reason : Due to end correction effective length of pipe increases.

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

Q.105 **Assertion :**   Sonometer is used to determine frequency of unknown T.F.

Reason : In sonometer riders used as indicator.

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

ANSWER KEY

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