JEE

Prayas JEE (2025)

Physics

Waves

DPP: 6

Q1 An open pipe is suddenly closed at one end and the result frequency of third harmonic of the closed pipe is found to be higher by $100\ \text{Hz}$ then the fundamental frequency of the open pipe is:
(A) $200\ \text{Hz}$
(B) $300\ \text{Hz}$
(C) $240\ \text{Hz}$
(D) $480\ \text{Hz}$

Q2 A uniform string of length L and mass M is fixed at both ends under tension T. Then it can vibrate with frequency given by the formula.
(A) $f = \frac{1}{2}\sqrt{\frac{T}{ML}}$
(B) $f = \frac{1}{2L}\sqrt{\frac{T}{M}}$
(C) $f = \frac{1}{2}\sqrt{\frac{T}{M}}$
(D) $f = \frac{1}{2}\sqrt{\frac{M}{LT}}$

Q3 With the increase of temperature, the frequency of the organ pipe
(A) Increases
(B) Decreases
(C) Remains unchanged
(D) Cannot say

Q4 The velocity of sound in air is $330\ \text{m/s}$. The fundamental frequency of an organ pipe open at both ends and of length 0.55 metre will be:
(A) $200\ \text{Hz}$
(B) $550\ \text{Hz}$
(C) $300\ \text{Hz}$
(D) $275\ \text{Hz}$

Q5 The equation of a standing wave in a string fixed at both ends is given as $y = 2A\sin kx\cos\omega t$. The amplitude and frequency of a particle vibrating at the mid of an antinode and a node are respectively
(A) $A, \frac{\omega}{2\pi}$
(B) $\frac{A}{\sqrt{2}}, \frac{\omega}{2\pi}$
(C) $A, \frac{\omega}{\pi}$
(D) $\sqrt{2}A, \frac{\omega}{2\pi}$

Q6 A wire of length l having tension T and radius r vibrates with fundamental frequency f. Another wire of the same metal with length $2l$ having tension $2T$ and radius $2r$ will vibrate with fundamental frequency
(A) f
(B) $2f$
(C) $\frac{f}{2\sqrt{2}}$
(D) $\frac{f}{\sqrt{2}}$

Q7 The vibrations of string of length $60\ \text{cm}$ fixed both ends are represented by the equations $y = 4\sin(\pi x/15)\cos(96\pi t)$ where x and y are in cm and t in s. The maximum displacement at $x = 5\ \text{cm}$ is
(A) $2\sqrt{3}\ \text{cm}$
(B) $4\ \text{cm}$
(C) zero
(D) $4\sqrt{2}\ \text{cm}$

Q8 The equation of a stationary wave is represented by

$$y = 4\sin\left(\frac{\pi x}{6}\right)(\cos 20\pi t)$$

where x and y are in cm and t is in second.Wavelength of the component waves is
(A) $4\ \text{cm}$
(B) $20\ \text{cm}$
(C) $12\ \text{cm}$

(D) $6\ \text{cm}$

Q9 The speed of sound in hydrogen at NTP is $1270\ \text{m/s}$. Then the speed in m/s in a mixture of hydrogen and oxygen in the ratio $4:1$ by volume will be

(A) 635 (B) 318

(C) 158 (D) 1270

Q10 A source x of unknown frequency produces 4 beats with a source of $250\ \text{Hz}$ and 6 beats with a source of $260\ \text{Hz}$. The frequency of source x is

(A) $258\ \text{Hz}$

(B) $254\ \text{Hz}$

(C) $262\ \text{Hz}$

(D) $282\ \text{Hz}$

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Answer Key

Q1	(A)	Q6	(C)
Q2	(A)	Q7	(A)
Q3	(A)	Q8	(C)
Q4	(C)	Q9	(A)
Q5	(D)	Q10	(B)