# Waves

**Q.No.1:** A pipe of length 85 cm is closed at one end. Find the number of possible natural oscillations of the air column in the pipe whose frequencies lie below 1250 Hz. The velocity of sound in air is 340 m/s.

**A.** 6
**B.** 4
**C.** 12
**D.** 8

**Q.No.2:** A train is moving on a straight track with speed 20 $ms^{-1}$. It is blowing its whistle at the frequency of 1000 Hz. The percentage change in the frequency heard by a person standing near the track as the train passes him is (speed of sound = 320 $ms^{-1}$) close to **JEE 2015**

**A.** 6 %
**B.** 12 %
**C.** 18 %
**D.** 24 %

**Q.No.3:** A musician using an open flute of length 50 cm produces second harmonic sound waves. A person runs towards the musician from another end of a hall at a speed of 10 km/h. If the wave speed is 330 m/s, the frequency heard by the running person shall be close to: **JEE 2019**

**A.** 666 Hz
**B.** 753 Hz
**C.** 500 Hz
**D.** 333 Hz

**Q.No.4:** A string of length 1 m and mass 5 g is fixed at both ends. The tension in the string is 8.0 N. The string is set into vibration using an external vibrator of frequency 100 Hz. The separation between successive nodes on the string is

close to: **JEE 2019**

**A.** 10.0 cm

**B.** 33.3 cm

**C.** 16.6 cm

**D.** 20.0 cm

**Q.No.5:** A train moves towards a stationary observer with speed 34 m/s. The train sounds a whistle and its frequency registered by the observer is $f_1$. If the speed of the train is reduced to 17 m/s, the frequency registered is $f_2$. If speed of sound is 340 m/s, then the ratio $f_1/f_2$ is: **JEE 2019**

**A.** 18/17

**B.** 19/18

**C.** 20/19

**D.** 21/20

**Q.No.6:** A closed organ pipe has a fundamental frequency of 1.5 kHz. The number of overtones that can be distinctly heard by a person with this organ pipe will be: (Assume that the highest frequency a person can hear is 20,000 Hz) **JEE 2019**

**A.** 6

**B.** 4

**C.** 7

**D.** 5

**Q.No.7:** 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: **JEE 2019**

**A.** 10 N

**B.** 7.5 N

**C.** 12.5 N

**D.** 5 N

**Q.No.8:** A travelling harmonic wave is represented by the equation $y(x, t) = 10^{-3} \sin(50t + 2x)$, where $x$ and $y$ are in meter and $t$ is in seconds. Which of the following is a correct statement about the wave? **JEE 2019**

**A.** The wave is propagating along the negative $x$-axis with speed 25 $ms^{-1}$.

**B.** The wave is propagating along the positive *x*-axis with speed 100 $ms^{-1}$.

**C.** The wave is propagating along the positive *x*-axis with speed 25 $ms^{-1}$.

**D.** The wave is propagating along the negative *x*-axis with speed 100 $ms^{-1}$.

**Q.No.9:** Which of the following equations represents a travelling wave?

**JEE 2021**

**A.** y = Asin(15x – 2t)

**B.** $y = Ae^{x}\cos(\omega t - \theta)$

**C.** y = Asinx cosωt

**D.** $y = Ae^{-x^2}(vt + \theta)$

**Q.No.10:** Two cars are approaching each other at an equal speed of 7.2 km/hr. When they see each other, both blow horns having frequency of 676 Hz. The beat frequency heard by each driver will be _____ Hz. [Velocity of sound in air is 340 m/s.]

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