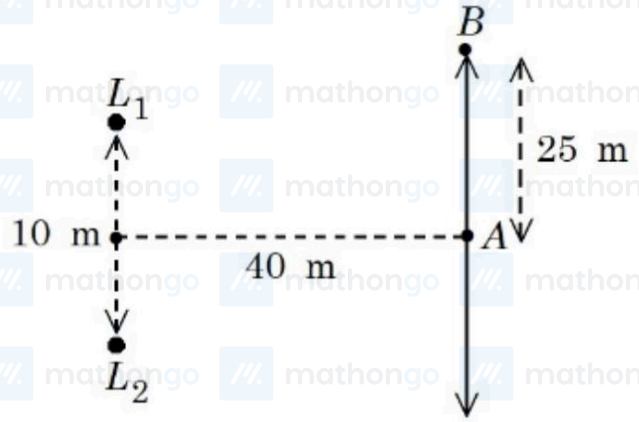
**Q1. 21 January Shift 1**

Two strings $(A, B)$ having linear densities $\mu_A = 2 \times 10^{-4}$ kg/m and, $\mu_B = 4 \times 10^{-4}$ kg/m and lengths $L_A = 2.5$ m and $L_B = 1.5$ m respectively are joined. Free ends of $A$ and $B$ are tied to two rigid supports $C$ and $D$, respectively creating a tension of 500 N in the wire. Two identical pulses, sent from $C$ and $D$ ends, take time $t_1$ and $t_2$, respectively, to reach the joint. The ratio $t_1/t_2$ is :

(1) 1.90 (2) 1.67 (3) 1.08 (4) 1.18

**Q2. 22 January Shift 1**

Two loudspeakers ($L_1$ and $L_2$) are placed with a separation of 10 m, as shown in figure. Both speakers are fed with an audio input signal of same frequency with constant volume. A voice recorder, initially at point $A$, at equidistance to both loud speakers, is moved by 25 m along the line $AB$ while monitoring the audio signal. The measured signal was found to undergo 10 cycles of minima and maxima during the movement. The frequency of the input signal is




____ Hz (Speed of sound in air is 324 m/s and $\sqrt{5} = 2.23$)

**Q3. 22 January Shift 2**

In an open organ pipe $\nu_3$ and $\nu_6$ are $3^{rd}$ and $6^{th}$ harmonic frequencies, respectively. If $\nu_6 - \nu_3 = 2200$ Hz then length of the pipe is ____ mm . (Take velocity of sound in air is 330 m/s.)

(1) 275 (2) 250 (3) 225 (4) 200

**Q4. 23 January Shift 2**

The velocity of sound in air is doubled when the temperature is raised from 0°C to $\alpha$°C. The value of $\alpha$ is ____.

**Q5. 24 January Shift 2**

A point source is kept at the center of a spherically enclosed detector. If the volume of the detector increased by 8 times, the intensity will

(1) increase by 64 times (2) increase by 8 times

(3) decrease by 4 times (4) decrease by 8 times

**Q6. 24 January Shift 2**

The fifth harmonic of a closed organ pipe is found to be in unison with the first harmonic of an open pipe. The ratio of lengths of closed pipe to that of the open pipe is $5/x$. The value of $x$ is ____.

(1) 3 (2) 4 (3) 1 (4) 2

**Q7. 28 January Shift 2**

The speed of a longitudinal wave in a metallic bar is 400 $\mathrm{m/s}$. If the density and Young's modulus of the bar material are increased by 0.5% and 1%, respectively then the speed of the wave is changed approximately to ____ $\mathrm{m/s}$.

(1) 398 (2) 401 (3) 399 (4) 402

**Q8. 28 January Shift 2**

Two tuning forks $A$ and $B$ are sounded together giving rise to 8 beats in 2 s. When fork $A$ is loaded with wax, the beat frequency is reduced to 4 beats in 2 s. If the original frequency of tuning fork $B$ is 380 Hz then original frequency of tuning fork $A$ is ____ Hz.

## ANSWER KEYS

**1.** (4) **2.** 600 **3.** (3) **4.** 819 **5.** (3) **6.** (4) **7.** (2) **8.** 384