

QUES 03:-

A train, standing at the outer signal of a railway station blows a whistle of frequency 400 Hz in still air.

- i. What is the frequency of the whistle for a platform observer when the train
 - a. approaches the platform with a speed of 10 ms^{-1} ,
 - b. recedes from the platform with a speed of 10 ms^{-1} ?
- ii. What is the speed of sound in each case? The speed of sound in still air can be taken as 340 ms^{-1} .

Sol. Frequency of whistle, $\nu = 400 \text{ Hz}$, speed of sound, $u = 340 \text{ ms}^{-1}$ speed of train, $u_s = 10 \text{ ms}^{-1}$

- i. a. When the train approaches the platform (i.e., the observe at rest)

$$\nu' = \frac{v}{v-v_s} \times \nu = \frac{340}{340-10} \times 400 = 412 \text{ Hz.}$$

- b. When the train recedes from the platform (i.e., from the observer at rest)

$$\nu' = \frac{v}{v+v_s} \times \nu = \frac{340}{340+10} \times 400 = 389 \text{ Hz}$$

- ii. The speed of sound in each case does not change. It is 340 ms^{-1} in each case.