QUES 06:-

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: **[Main 9 Jan. 2019 II]**

(a) 666 Hz (b) 753 Hz (c) 500 Hz (d) 333 Hz

(a) Frequency of the sound produced by open flute.

$$f = 2\left(\frac{v}{2\ell}\right) = \frac{2\times 330}{2\times 0.5} = 660 Hz$$

Velocity of observer, $v_0 = 10\times\frac{5}{18} = \frac{25}{9} m/s$

As the source is moving towards the observer therefore, according to Doppler's effect.

$\therefore$ Frequency detected by observer,

$$f' = \left[\frac{v+v_0}{v}\right] f = \left[\frac{\frac{25}{9}+330}{330}\right] 660$$

$$= \frac{2995}{9\times 330}\times 660 \text{ or, } f' = 665.55 \simeq 666 \text{ Hz}$$