QUES 02:-

The driver of a bus approaching a big wall notices that the frequency of his bus's horn changes from 420 Hz to 490 Hz when he hears it after it gets reflected from the wall. Find the speed of the bus if speed of the sound is 330 ms^{-1}.

[Main Sep. 04, 2020 (II)]

(a) 91 kmh^{-1} (b) 81 kmh^{-1} (c) 61 kmh^{-1} (d) 71 kmh^{-1}

(a) From the Doppler's effect of sound, frequency appeared at wall

$$f_w = \frac{330}{330 - v} \cdot f \qquad ...(i)$$

Here, v = speed of bus,

f = actual frequency of source

Frequency heard after reflection from wall (f') is

$$f' = \frac{330 + v}{330} \cdot f_w = \frac{330 + v}{330 - v} \cdot f$$

$$\Rightarrow 490 = \frac{330 + v}{330 - v} \cdot 420$$

$$\Rightarrow v = \frac{330 \times 7}{91} \approx 25.38 \text{ m/s} = 91 \text{ km/s}$$