QUES 04:-

A stationary source emits sounds waves of frequency 500 Hz. Two observers moving along a line passing through the source detect sound to be of frequencies 4801 Hz and 530 Hz. Their respective speeds are, in ms^{-1}, (Given speed of sound = 300 m/s) **[Main 10 April 2019 I]**

(a) 12, 16 (b) 12, 18 (c) 16, 14 (d) 8, 18

(b) Frequency of sound source (f_0) = 500 Hz

When observer is moving away from the source

Apparent frequency $f_1 = 480 = f_0\left(\frac{v - v_0'}{v}\right)$ ....(i)

And when observer is moving towards the source

$f_2 = 530 = f_0\left(\frac{v - v_0''}{v}\right)$ ....(ii)

From equation (i)

$480 = 500\left(\frac{300 - v_0'}{300}\right)$

$v'_0 = 12$ m/s

From equation (ii)

$530 = 500\left(1 + \frac{v_0''}{v}\right)$ $\therefore V''_0 = 18$ m/s