QUESTION

Q2. The intensity of sound from a loud speaker, measured at a distance of

r_1=1 meters from the source is **I_1**=5.0x10--4 W/m2

(a) Calculate the intensity of the sound at a distance **r_2=** 6 m from the source.

(b) Calculate the decibel change between the two positions.

SOLUTION

Intensity of sound is

$$I_1 = \frac{P_{acc}}{4\pi r_1^2}$$

$$I_2 = \frac{P_{acc}}{4\pi r_2^2}$$

Hence

$$P_{acc} = I_1 4\pi r_1^2$$

$$I_2 = \frac{I_1 4\pi r_1^2}{4\pi r_2^2} = \frac{r_1^2}{r_2^2} I_1$$

I_2=0.139 x10^{-4} Wt/m^2

Sound level is

$$L_1 = 10lg\frac{I_1}{I_0}$$

$$L_2 = 10lg\frac{I_2}{I_0}$$

I_0=10^{-12} Wt/m^2 is the standard reference sound intensity

Hence

L_1=86.9897 dB

L_2=71.4267 dB

The decibel change between two positions is L_1-L_2=15,563 dB