in decibles per unit length (i.e dB/km)

$$\alpha = \frac{10}{L} \log_{10} \frac{P_i}{P_o} \quad (dB/km)$$

Problem statement:

1. The Mean optical power launched into an ~~option~~ optical link is 1.5 mW.
   a) Plot output power vs distance for different values of attenuation coefficient
   b) Determine the maximum possible link length without repeaters for alpha = 2dB/km, 0.5dB/km and 0.2 dB/km. The minimum mean optical power level required at the director is 2μW.

→ Given

$P_{in} = 1.5$ mW

$L = 1$ km

$\alpha = 0.2$ dB/km, 0.5 dB/km, 2 dB/km

$P_0 = 1.5 * 10^{-3} / 10^{(0.2 * 1/10)} = 1.43$ mW

$P_0 = 1.5^4 10^{-3} / 10^{(6.5 * 1/10)} = 1.34$ mW

$P_0 = 1.5^4 10^{-3} / 10^{(2 * 1/10)} = 0.94$ mW

$$L = \frac{10}{\alpha} \log_{10} \left(\frac{P_i}{P_0} \right)$$

$$L = \frac{10}{0.2} \log_{10} \left(\frac{1.5 \times 10^{-3}}{2 \times 10^{-6}} \right) = 143.75$$

$$L = \frac{10}{0.5} \log_{10} \left(\frac{1.5 \times 10^{-3}}{2 \times 10^{-6}} \right) = 57.50$$

$$L = \frac{10}{2} \log_{10} \left(\frac{1.5 \times 10^{-3}}{2 \times 10^{-6}} \right) = 14.37$$

Conclusion:

In this experiment we studied the attenuation characteristics of optical fiber.

Praveen