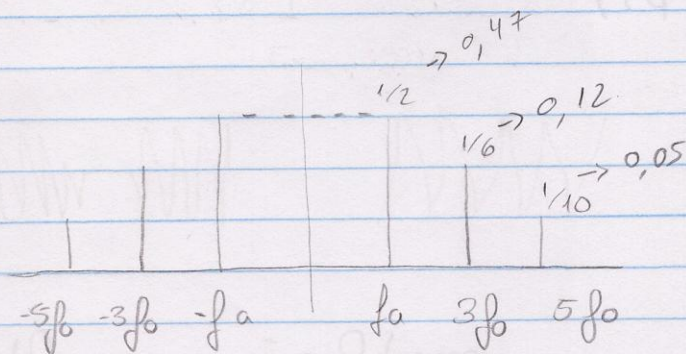


01.05.11/28

$$x(t) = \cos(2\pi f_0 t) + \frac{1}{3} \cos(2\pi 3f_0 t + \pi/180) + \frac{1}{5} \cos(10\pi f_0 t)$$

$$y(t) = 0,94 + 0,24 + 0,1$$



$$e_{1,-1} = 1/2 \times 0,95 \approx 0,47$$

$$e_{3,-3} = 1/6 \times \frac{1}{\sqrt{2}} \approx 0,12$$

$$e_{5,-5} = 1/10 \times 0,51 \approx 0,05$$

$$|x(t)| \rightarrow |H(f)| \rightarrow |y(t)|$$

$$|H(f_0)| \approx 0,95$$

$$|H(f_3)| = \frac{1}{\sqrt{2}}$$

$$|H(f_5)| \approx 0,51$$

$$4) \quad H(f) = \frac{3,75 \times 10^3}{3,75 \times 10^3 - j 9 \times 10^{-4} + j f}$$

$$= \frac{1}{1 + j \frac{(-9 \times 10^{-4} + f)}{3,75 \times 10^3}}$$

$$|H(f)| = \frac{1}{\sqrt{1^2 + \left(\frac{9 \times 10^{-4} + f}{3,75 \times 10^3} \right)^2}}$$

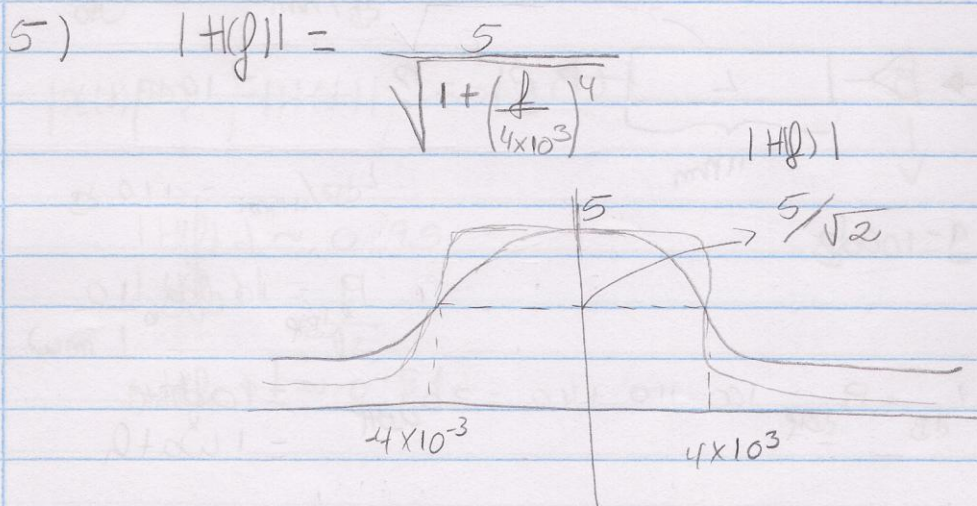
$$P_S = 10 \log_{10} \frac{100^{-3}}{10^{-3}}$$

$$P_S = 10 \log_{10} 100 \times 10^{-3} \times 10^3$$

$$P_S = 10 \times 2 = 20$$

$$P_{dBm} = -17 \text{ dBm}$$

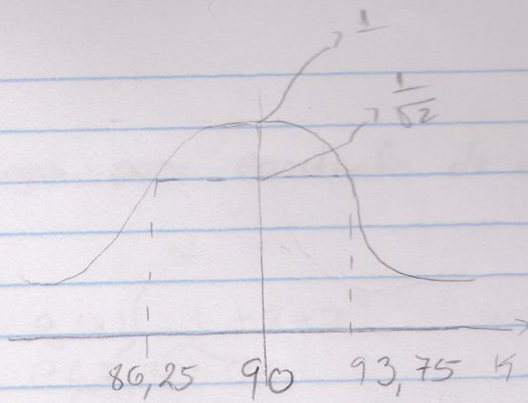
$$\begin{aligned} -17 &= 10 \log_{10} P_{dBm} \\ &= 22 \text{ Km} \end{aligned}$$



Ganho máximo do sistema 20

Banda de transmissão = 4×10^3

frequência de corte



sistema / filtro

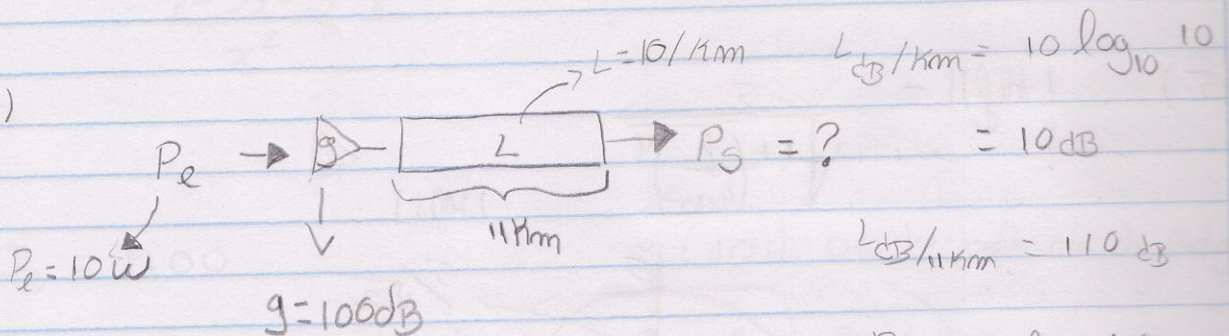
Passa banda centrado em 90

filtro atenuador

banda [86,25, 93,75] kHz de transmissão

31/12/2010

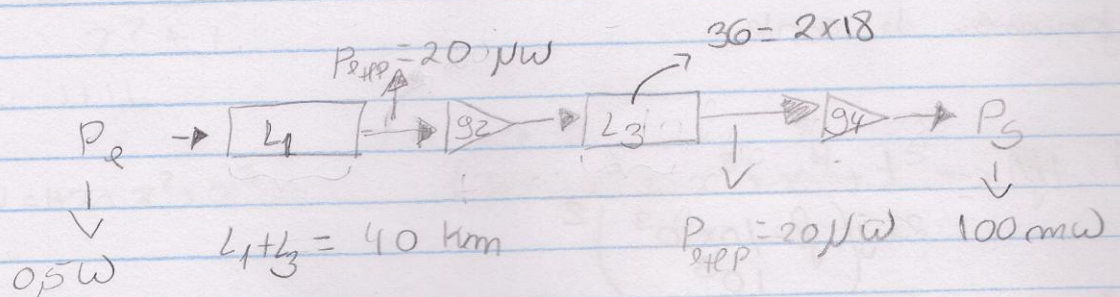
2)



$$P_s = g_{dB} - L_{dB} + P_e = 100 - 110 + 40 = 30 \text{ dBm} = 40 \text{ dBm} = 1 \text{ Wath}$$

$$\rightarrow L_{dB} = \alpha d \quad L_{11km} = 10'' \quad g = 10^{10} \quad P_s = \frac{P_e \cdot g}{L} = 1 \text{ Wath}$$

3)



$$\alpha = 2 \text{ dB/km}$$

$$g_2 = ? 36 \text{ dB} \quad d_2 = ? 18 \text{ km}$$

$$g_4 = ? 37 \text{ dB}$$

$$d_1 = ? 22 \text{ km}$$

$$P = 10 \log_{10} \frac{0,5}{10^{-3}}$$

$$P = 10 \log_{10} 0,5 \times 10^3$$

$$P = 10 \log_{10} 500 \approx 27$$

$$3. H(f) = \frac{1}{25 + \left| \frac{f - 10 \times 10^3}{10^3} \right|^2}$$

$$= \frac{(1/25)}{1 + \left| \frac{f - 10 \times 10^3}{5 \times 10^3} \right|^2}$$

$$|H(f)| = \frac{(1/25)}{\sqrt{1 + \left| \frac{f - 10 \times 10^3}{5 \times 10^3} \right|^2}}$$

A₁. Verdadeiro

B₂. $(25)^2$. Falso

C₃. Verdadeiro

D₄. Verdadeiro