

$t = kT_0, k = 0, 1, 2, \dots$ $T_0 = 1.5 \mu s$ $\rightarrow 40 \text{ ns}$

$L = 8$

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$\sigma(t) = 1 \cdot \cos(2\pi \cdot 1000 \cdot t) \text{ [V]}$

$2 \cdot 10^{-2} \text{ s}$

3 s

$T = 1 \cdot 2 \cdot \left(\frac{1}{2}\right)^2 = 1 \cdot 0.5 = 0.5$

$\frac{1.5}{10} = 0.15$

$$3) \quad \omega = 1000 \text{ rad/s} \quad \epsilon = 20$$

$$|H(j\omega)| = \frac{1}{\sqrt{2 + 100}} = \frac{1}{10.1}$$

$$|H(j\omega)| = 0.0099$$

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4)

$$u, v, w$$

$$\frac{u}{v} = \frac{1}{5} \rightarrow 10 + 10 - 50 - 10 = \frac{1}{5} = \frac{1}{5}$$

$$\frac{u}{v} = \frac{1}{5}$$

$$u = v \left(\frac{1}{5} \right) = \frac{v}{5}$$

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$$\frac{u}{v} = \frac{1/5}{1} = \frac{1}{5} = 0.2$$

5)

$$NPF \quad f_0 = 10 \text{ Hz}$$

$$B_w = 10^3 \text{ Hz}$$

$$|H(f)| = 0.2$$

$$0 < f < B$$

$$u = v \cdot B$$

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$$u = v \cdot B$$

$$f = 10 \text{ Hz}$$

$$B = 10^3 \text{ Hz}$$

$$u = v \cdot B$$

$$u = 0.01 \text{ m/s}$$

$\omega = 10^4 \text{ rad/s}$
 $\omega_{max} = 10^4$
 $\omega_{min} = 10^3$

bandwidth: $\omega_{max} - \omega_{min} = 10^4 - 10^3 = 9 \times 10^3$

$$10 \log \left(\frac{P_1}{P_2} \right) = 10 \log \left(\frac{P_1}{P_2} \right) = 5 \text{ dB}$$

$$\log \left(\frac{P_1}{P_2} \right) = 0.5$$

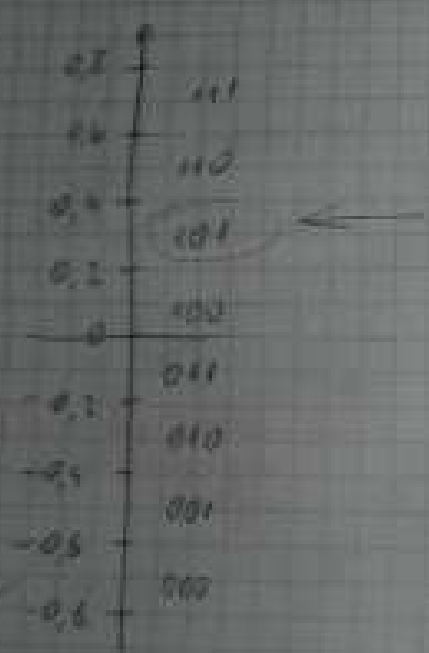
$$\frac{P_1}{P_2} = 3.16227$$

$$P_1 = \frac{0.2^2}{3.16227} = 0.0126 \rightarrow \underline{P_1 = 0.0126}$$

$$u_1(t) = 0.0126 \sin(2\pi \cdot 10^4 t - \frac{\pi}{4})$$

$$u_1(0) = 0.0126$$

$$\Delta = \frac{u_1(0)}{L} = 0.2$$



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$$3 = 2 \left(\frac{1}{12} \right)^{1/2} \approx 0.5$$

$$N = \frac{1}{2} \cdot \frac{2}{1000} \cdot 10^6 = 0,0029297$$

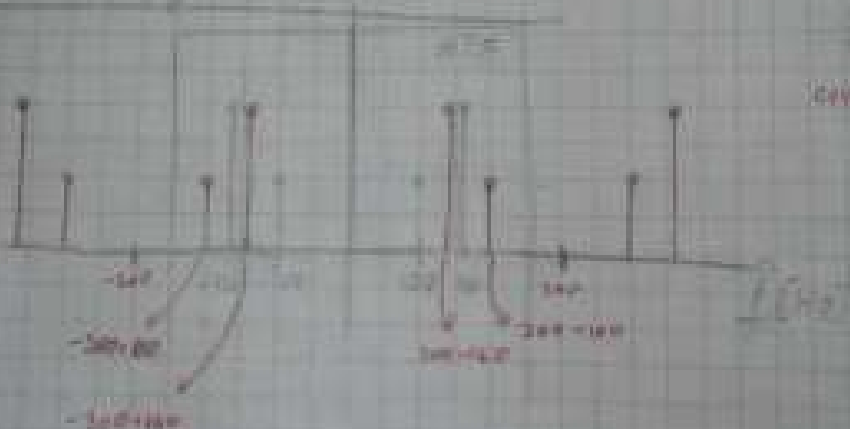
$$2. \log \frac{1}{H} = 22,32 \text{ dB}$$

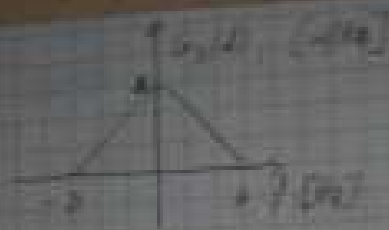


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$$f(t) = \begin{cases} t+2 & -2 \leq t < 0 \\ -t & 0 \leq t \leq 2 \end{cases}$$

$$\begin{aligned} S &= \int_{-2}^0 \frac{t+2}{2} dt + \int_0^2 \frac{-t}{2} dt \\ &= \int_{-2}^0 \frac{t}{2} dt + \int_{-2}^0 1 dt - \int_0^2 \frac{t}{2} dt - \int_0^2 1 dt \\ &= \frac{1}{2} \left(-\frac{t^2}{2} \right) \Big|_{-2}^0 - 2 \cdot 2 - \frac{1}{2} \left(\frac{t^2}{2} \right) \Big|_0^2 - 2 \cdot 2 \\ &= -\frac{0^2}{2} - \frac{(-2)^2}{2} - 4 - \frac{2^2}{2} - 4 \\ &= -2 - 4 - 4 - 4 \\ &= -14 \text{ [W]} \end{aligned}$$

15)

$$\begin{aligned} f(t) &= \text{rect}(t) \cdot \cos(2\pi t) \\ f_{\text{avg}} &= \int_{-1}^1 \cos(2\pi t) dt \\ f_{\text{avg}} &= \frac{1}{2} \cdot 0 = 0 \\ f_{\text{avg}} &= \frac{1}{2} \cdot 0 = 0 \end{aligned}$$

16)

$$\begin{aligned} H(f) &= 0.75 \cdot 10^4 \text{ dB} \\ \text{Total Power } S_{\text{tot}} &= 4 \cdot 10^3 \text{ W/KHz} \\ T &= 333 \text{ s} \\ B &= 15 \text{ Hz} \\ S &= ? \\ R &= \frac{N \cdot C}{T} = 2000 \text{ bit/s} \\ N &= S_{\text{tot}} \cdot B = 4 \cdot 10^3 \cdot 15 = 60 \text{ kHz} \\ N &= 8 \cdot 10^4 \\ C &= 3 \log \left(1 + \frac{S}{N} \right) \\ 0.75 \log \left(1 + \frac{S}{8 \cdot 10^4} \right) &= 2000 \\ \frac{S}{8 \cdot 10^4} &= 4 \Rightarrow S = 32 \cdot 10^4 \end{aligned}$$

FWG-N kanal

$$\begin{aligned} S_1 &= S_2 = \frac{S}{N} > 1 \\ C_1 &= C_2 = \dots \\ N &= 2 \end{aligned}$$

$$C_1 = 3 \log \left(1 + \frac{S_1}{N} \right) = 3 \log \left(\frac{S}{N} \right)$$

$$C_2 = 3 \log \left(1 + \frac{S_2}{N} \right)$$

$$C_2 = 3 \log \left(1 + \frac{S_2}{N} \right) = 3 \log \left(\frac{S_2}{N} \right)$$

$$C_2 - C_1 = 3 \log \left(\frac{S_2}{N} \right) - 3 \log \left(\frac{S_1}{N} \right)$$

$$= 3 \log \left(\frac{S_2}{S_1} \right)$$

$$C_2 - C_1 = 3 \log n \quad (\text{zovna})$$

$\sigma = 1,8 \text{ W}$ (Gaussova šuma gustine γ pripadajuć h
FWG-N kanal

$$S_H = 7,5 \cdot 10^{-3} \text{ W/Hz} \rightarrow H_0 = 1,5 \cdot 10^{-3} \text{ W/Hz}$$

$$\text{max } C = ?$$

$$C = \frac{S}{N_0} \log_2 \left(1 + \frac{S}{N_0} \right)$$

$$C = 482,72 \text{ bit/s}$$