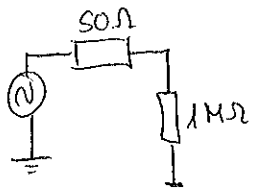
1-3-07
SRO

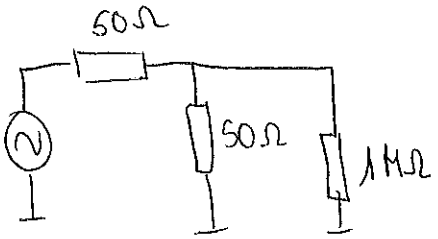
• Ejercicio ∅ Grupo 21

Rehacer apartados 2. b y 4 y entregarlo el lunes al profesor de laboratorio

① 

a) Como $50 \ll 1M\Omega$ $\quad Z_L$ = Open. circuit

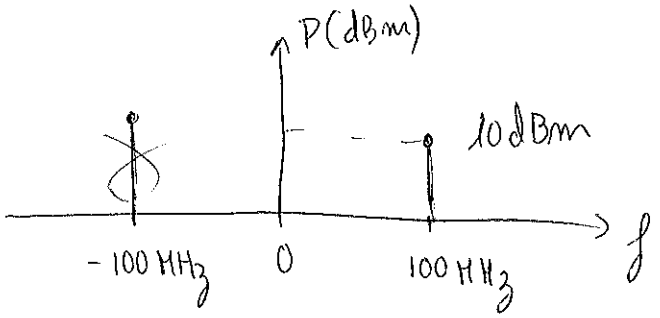
Amplitud = 2V $\Rightarrow V_{pp} = 2 \cdot 2 = 4V$ ✓

b) 

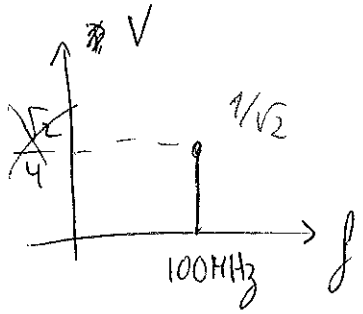
- El // de 50Ω i 1MΩ ≅ 50Ω
- Si fem el divisor de tensió

obtenim que amplitud = 1V i per tant $V_{pp} = 1V \cdot 2 = 2V$ ✓

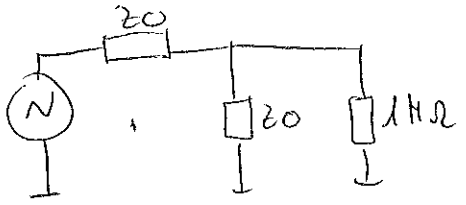
c) $P(t) = \frac{V^2}{2R} = \frac{1^2}{2 \cdot 50} = \frac{1}{100} = 0'01\ W \rightarrow P_{dBm} = 10 \log 10mW = 10 dBm$



✓

d) Con el A.E la tensió $V_{EF} = \frac{1}{2} \cdot \frac{1}{\sqrt{2}} \Rightarrow$ 

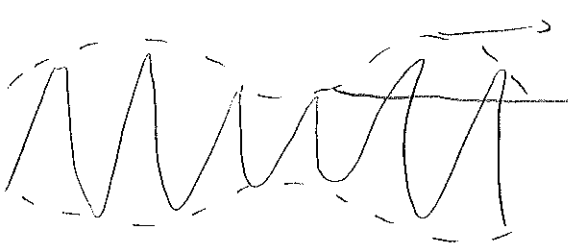
(2)



$v(t) = V_p (1 + m \cos 2\pi f_m t) \cos(2\pi f_p t)$ V

$F_p >> f_m$

a)



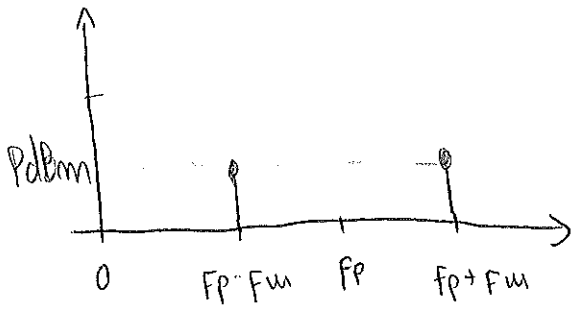
$V_{MAX} = V_p [1 + m]$

$V_{MIN} = V_p [1 - m]$ ✓

b) $v(t) = V_p [1 + m \cdot \cos(2\pi f_m t)] \cos(2\pi f_p t)$

$v(t) = V_p (\cos(2\pi f_p t) + m \cos \underbrace{(2\pi f_m t)}_{B} \underbrace{\cos(2\pi f_p t)}_{A}$

$v(t) = V_p \left[\cos(2\pi f_p t) + m \cdot \frac{1}{2} (\cos(A+B) + \cos(A-B)) \right]$



$P_{dBm} = 10 \log \frac{\frac{v(t)}{420} \cdot 10^{-3}}{1mW}$???

Error de operación

(3) $27,5 = V_p [1+m]$ → $V_p = \frac{27,5}{1+m}$

$12,5 = V_p [1-m]$ → $12,5 = \frac{27,5}{1+m} [1-m]$ ⇒ $m = 0'5$ B

$V_p = \frac{27,5}{1+0'5} = 18,33\,V = V_p$

(4) $P_{dBm} = 6,99\,dBm = 10 \log P_{mW}$ ⇒ $P_{mW} = 5mW = 5 \cdot 10^{-3} W$

$P = \frac{V^2}{4 \cdot 50}$ ⇒ $5 \cdot 10^{-3} \cdot 200 = V^2$ ⇒ $V = 1V$ $m = ?$

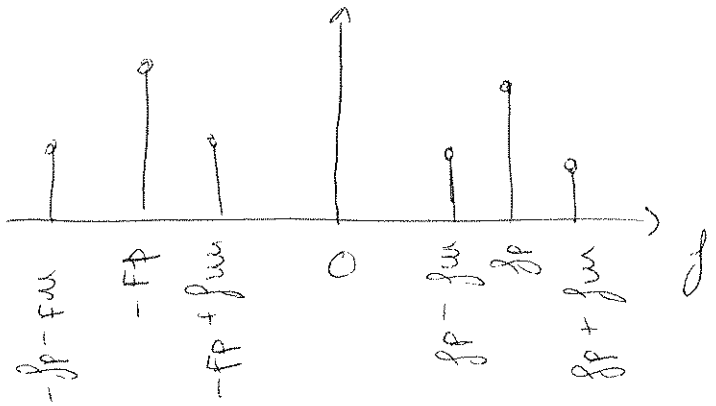
- De la gráfica deducimos $F_p = 25\,MHz$ ✓ $F_m = 5MHz$

Grupo 21

② b) $v(t) = V_p \left[1 + m \cdot \cos(2\pi f_m t)\right] \cos(2\pi f_p t)$

$v(t) = V_p \left(\cos(2\pi f_p t) + m \cos \underbrace{(2\pi f_m t)}_{B} \underbrace{\cos(2\pi f_p t)}_{A}\right)$

$v(t) = V_p \left[\cos(2\pi f_p t) + m \cdot \frac{1}{2}(\cos(A+B) + \cos(A-B))\right]$



- $P_p = \frac{1}{2R}\left(\frac{V_p}{\sqrt{2}}\right)^2$
- $P_{SB} = \frac{m^2 \left(\frac{X}{\sqrt{2}}\right)^2 P_p}{2R}$
- Pot en dBm $= 10 \log \frac{\left(\frac{V_p}{\sqrt{2}}\right)^2}{2 z_0} 10^3$
- Pot en dBu $= 10 \log \left[\left(\frac{m^2 (0'5^2/\sqrt{2})^2}{220} \cdot \frac{V_p^2}{220}\right) \cdot 10^3\right]$

④ $F_p = 25 MHz$

$F_m = 5 Hz$

$P_p = 6,99 dBm = \boxed{5 mW}$

$P_{SmB} = 0,969 dBm = \boxed{1,24 mW}$

- Amplitud portadora $\frac{V_p}{\sqrt{2}} = \sqrt{2 P_p z_0} = \sqrt{2 \cdot 5 mW \cdot 50} = 0,707_V \Rightarrow 0,707 \cdot \sqrt{2} \boxed{1V}$
- Amplitud modulación / índice modulación $1 = m^2 \left(\frac{X}{\sqrt{2}}\right)^2 = \frac{P_{SB} 2R}{P_p} = \frac{1'24 mW \cdot 2 \cdot 50\Omega}{5 mW} \Rightarrow$

$\Rightarrow m = -\left[(P_p - P_{SB})(dB) - 6dB\right] = -\left[(7-1) - 6\right] \Rightarrow 0dB \Rightarrow \boxed{m = 1}$