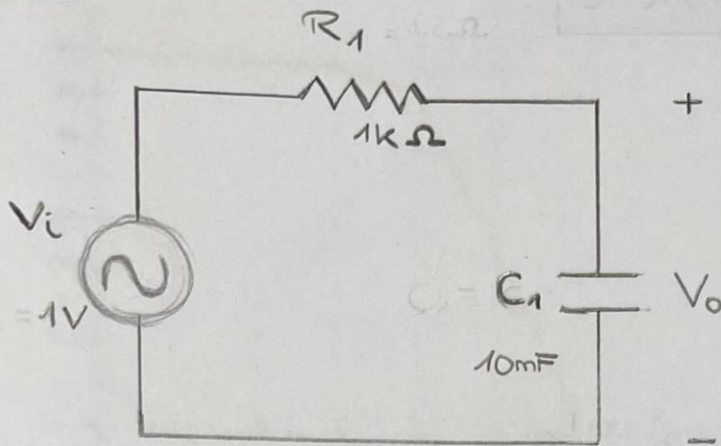


P.2. Estudi Preamplificador

EP.1:



$$V_o = \frac{C_1}{R_1 + C_1} \cdot V_i$$

$$H(s) = \frac{V_o(s)}{V_i(s)} \Rightarrow$$

$$\Rightarrow H(s) = \frac{\frac{1}{C \cdot s}}{R_1 + \frac{1}{C \cdot s}} = \frac{\frac{1}{C \cdot s}}{\frac{R_1 \cdot C \cdot s + 1}{C \cdot s}} = \frac{1}{R_1 \cdot C \cdot s + 1} = \frac{\frac{1}{R_1 \cdot C}}{s + \frac{1}{R_1 \cdot C}} \Rightarrow$$

$$\Rightarrow H(s) = \frac{10^5}{s + 10^5}$$

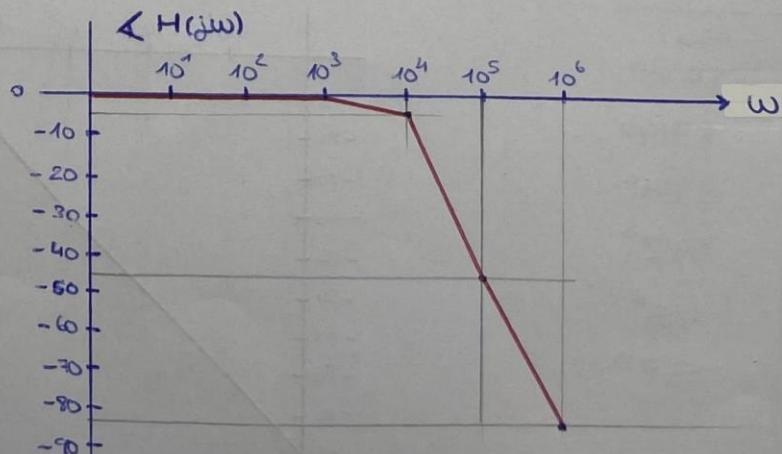
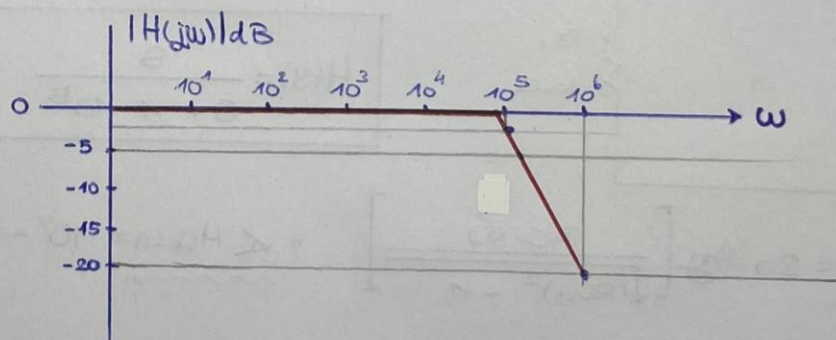
EP.2:

$$|H(j\omega)| = \frac{1/RC}{\sqrt{\omega^2 + \frac{1}{(RC)^2}}}$$

$$\bullet |H(j\omega)|_{dB} = 20 \cdot \log |H(j\omega)|$$

$$\bullet \angle H(j\omega) = -\arctan\left(\frac{\omega}{RC}\right)$$

ω	$ H(j\omega) _{dB}$	$\angle H(j\omega)$
0	0	0°
10^1	0	0°
10^2	0	-0'1°
10^3	0	-0'5°
10^4	0	-5'7°
10^5	-3	-45°
10^6	-20	-84'3°



EP.3:

$$\omega C = 1 \cdot 10^5, \quad f_c = \frac{\omega C}{2\pi} = \boxed{159,15 \text{ kHz}}$$

EP.4:

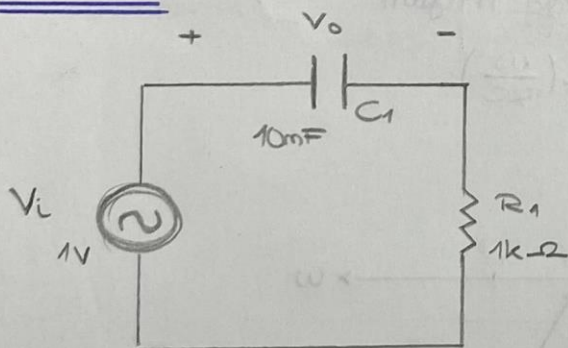
$$\text{Tenim: } |H(j\omega)| = \frac{1/RC}{\sqrt{\omega^2 + \frac{1}{(RC)^2}}}$$

• 1 kHz: $\rightarrow \omega = 2\pi \cdot 1 \cdot 10^3 = 6,28 \cdot 10^3 \text{ rad/s}$
 $\rightarrow |H(j\omega)| = \underline{0,99}$

• 10 kHz: $\rightarrow \omega = 62,8 \cdot 10^3 \text{ rad/s}$
 $\rightarrow |H(j\omega)| = \underline{0,84}$

• 100 kHz: $\rightarrow \omega = 628,2 \cdot 10^3 \text{ rad/s}$
 $\rightarrow |H(j\omega)| = \underline{0,157}$

EP.5:

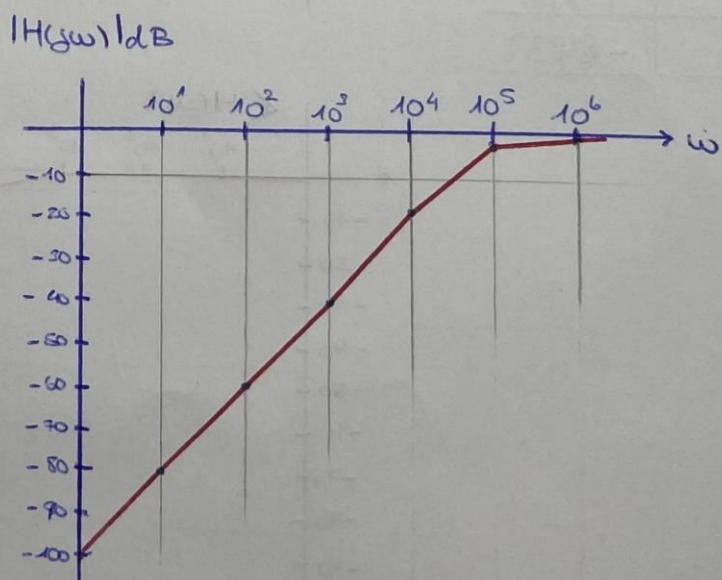


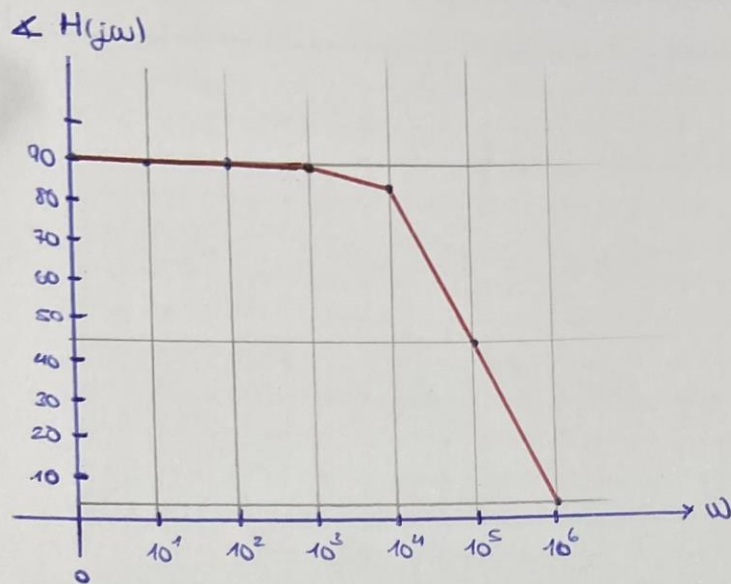
$$a) H(s) = \frac{s}{s + \frac{1}{RC}} = \frac{s}{s + 1 \cdot 10^5}$$

$$\boxed{H(s) = \frac{s}{s + 1 \cdot 10^5}}$$

b) $|H(j\omega)|_{dB} = 20 \cdot \log \left[\frac{RC \cdot \omega}{\sqrt{(RC\omega)^2 + 1}} \right]$ • $\angle H(j\omega) = 90^\circ - \arctg(RC\omega)$

ω	$ H(j\omega) _{dB}$	$\angle H(j\omega)$
0	-100	90°
10^1	-80	$89,9^\circ$
10^2	-60	$89,9^\circ$
10^3	-40	$89,4^\circ$
10^4	-20	$84,2^\circ$
10^5	-3	45°
10^6	0	$5,7^\circ$





c)

$$f_c = \frac{\omega_c}{2\pi} = \boxed{159,15 \text{ KHz}}$$

d)

$$|H(j\omega)| = \frac{RC \cdot \omega}{\sqrt{(RC\omega)^2 + 1}}$$

• 1 KHz : $\rightarrow \omega = 6,28 \cdot 10^3$

$\rightarrow |H(j\omega)| = 0,062$

• 10 KHz : $\rightarrow \omega = 62,8 \cdot 10^3$

$\rightarrow |H(j\omega)| = 0,531$

• 100 KHz : $\rightarrow \omega = 628,2 \cdot 10^3$

$\rightarrow |H(j\omega)| = 0,987$