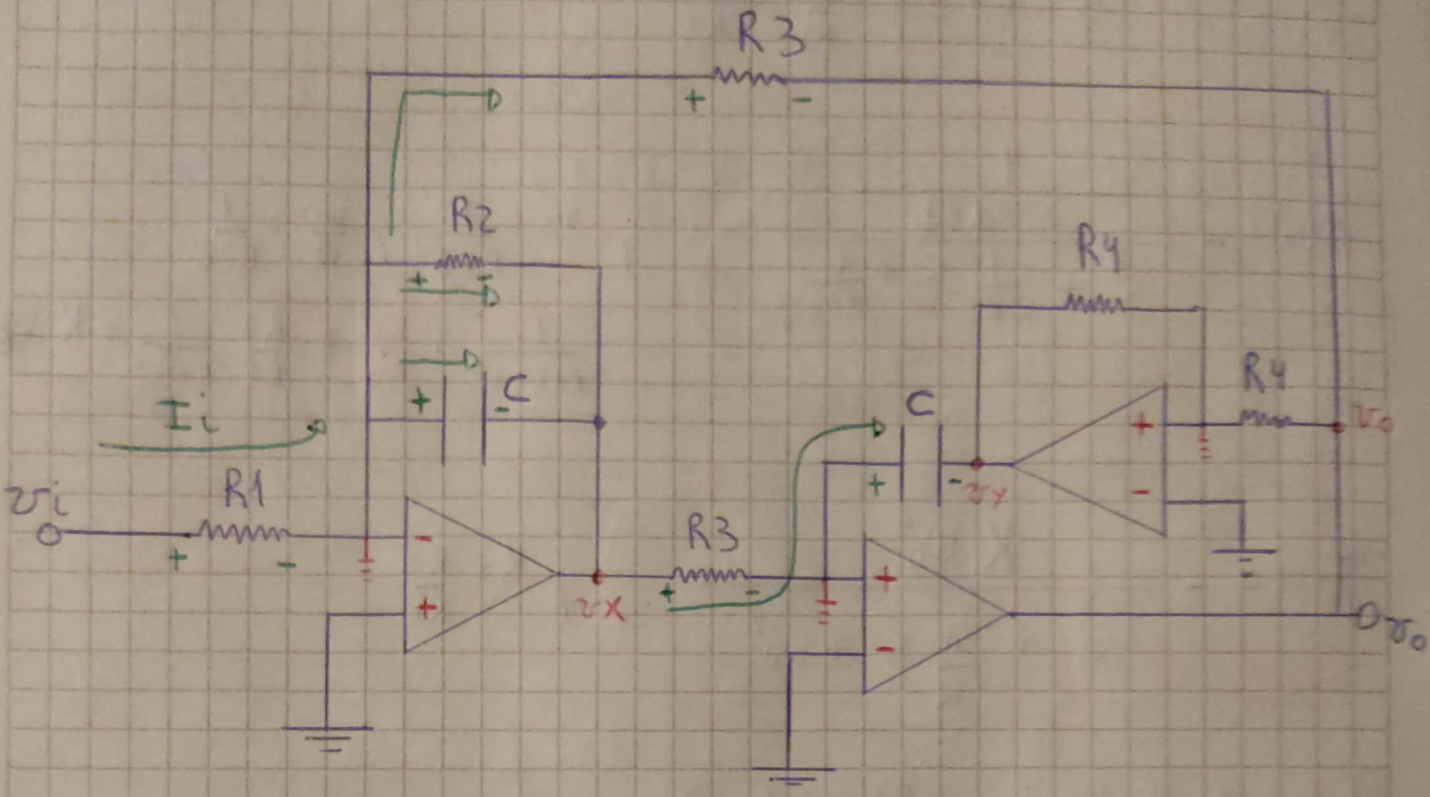
HOJA Nº

FECHA

TAREA SEMANAL 2



1)

$$\frac{v_o}{R4} = -\frac{v_y}{R4} \rightarrow v_y = -v_o \quad (1)$$

$$\frac{v_x}{R3} = -\frac{v_y}{\frac{1}{sC}} \Rightarrow v_x = sCR3\, v_o \quad (3)$$

(2)

$$\frac{1}{R1} v_i = -\left(v_x\left(sC + \frac{1}{R2}\right) + v_o\left(\frac{1}{R3}\right)\right) \quad (4)$$

(3) en (4)

$$\frac{1}{R1} v_i = -\left(sCR3\, v_o\left(sC + \frac{1}{R2}\right) + \frac{1}{R3} v_o \right)$$

$$\frac{1}{R1} v_i = -\left(s^2C^2R3 + sC\frac{R3}{R2} + \frac{1}{R3}\right) v_o$$

NOTA

$$T(S) = \frac{V_o}{V_i} = \frac{-1/R1}{S^2 C^2 R3 + S\,C\frac{R3}{R2} + \frac{1}{R3}}$$

$$T(S) = -\frac{\frac{1}{C^2 R1 R3}}{S^2 + \frac{1}{CR2}S + \frac{1}{C^2 R3^2}}$$

$$\cdot\ W_o^2 = \frac{1}{R3^2 C^2} \quad / \quad \frac{W_o}{Q} = \frac{1}{R2C}$$

$$\frac{1}{R1 R3 C^2} \cdot \frac{R3}{R3} = \frac{R3}{R1}\frac{1}{R3^2 C^2} = K \cdot W_o^2$$

$$T(S) = -\frac{K W_o^2}{S^2 + \frac{W_o}{Q}S + W_o^2} \quad ; \quad K = \frac{R3}{R1}$$

2) $W_o = 1 \rightarrow 1 = \frac{1}{R3.C} \Rightarrow R3.C = 1$

$Q = 3$

$\hookrightarrow \frac{W_o}{Q} = \frac{1}{R2C} \rightarrow R2.C = 3$

$$R3 \cdot \frac{3}{R2} = 1 \quad ; \quad R2 = 3R3$$

SUPONGO $R3 = 1K\Omega \rightarrow R2 = 3K\Omega$; $C = 1000\mu F$

ó $R3 = 100K\Omega \rightarrow R2 = 300K\Omega$; $C = 10\mu F$

3) $|T(0)| = 20\,dB \rightarrow 10$ VECES

$$T(w) = T(s)\Big|_{s=jw} = \left[- \frac{K w_0^2}{s^2 + \frac{w_0}{Q} s + w_0^2} \right]\Bigg|_{s=jw}$$

$$T(w) = \frac{-K w_0^2}{(w_0^2 - w^2) + \frac{w_0 . w}{Q}} \quad ; \quad |T(w)| = \frac{K w_0^2}{\sqrt{(w_0^2 - w^2)^2 + w^2 \frac{w_0^2}{Q^2}}}$$

↳ FILTRO PASA BAJOS

$$|T(w=0)| = K = \frac{R3}{R1} = 10 \quad / \quad R1 = R3/10$$

$R1 = 1K\Omega / 10 = 100$ ó $R1 = 100K\Omega / 10 = 10K\Omega$

BONUS

1) $\Omega_w = w_0$, $\$ = s/\Omega_w = s/w_0 \rightarrow s = \$. w_0$

$$T(s) = \frac{-K w_0^2}{\$^2 w_0^2 + \frac{w_0^2}{Q} \$ + w_0^2} \rightarrow T(s) = \frac{-K}{s^2 + \frac{1}{Q} s + 1}$$

NORMALIZACIÓN EN IMPEDANCIA

$\Omega Z = R3 = 1$; $\Omega w0 = w0 = 1$

$Q = \frac{R2}{R3} \rightarrow R2 = Q$; $w0 = \frac{1}{R3C} \Rightarrow C = 1$

$\frac{R1}{R3} = \frac{1}{K}$; $R1 = 1/K$; $R3 = 1$

Si $\Omega Z = 1K\Omega$; $R3 = 1K\Omega$; $C = \frac{1}{\Omega Z . \Omega w0} = 1mF$

$Q = 3$; $w0 = 1$

$\Omega Z . \Omega w0 = 1K\Omega$

$R2 = \overset{Q}{3} . \Omega Z = 3K\Omega$; $R1 = \frac{1}{K} . \Omega Z = 100\Omega$

$\frac{1}{K} = 10$

OTRO CASO

$\Omega Z = R2 = 1$; $R3 = \frac{1}{Q}$; $\overset{1}{w0} = \frac{1}{R3C}$; $R3C = 1$; $C = Q$

$R2 = 1$; $K = \frac{R3}{R1}$; $R1 = \frac{1}{K.Q}$