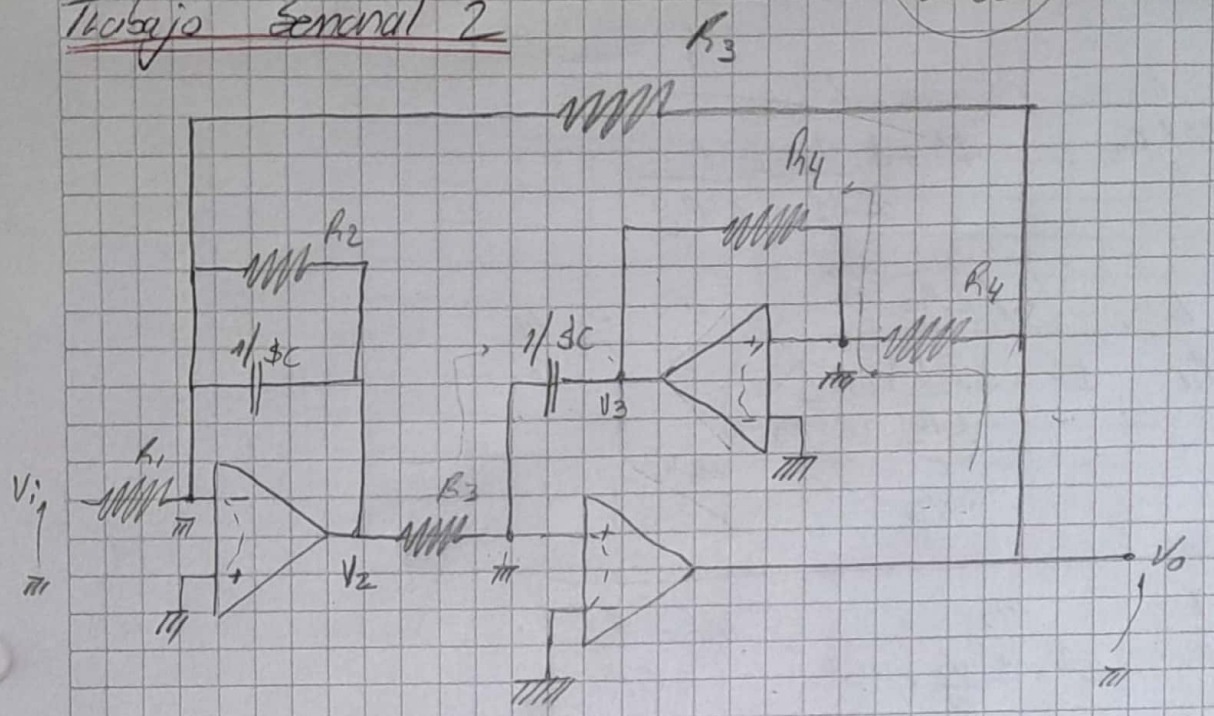
Trabajo Semanal 2



1) Calcule la Transferencia $T = \frac{V_o}{V_i}$, en función de ω y φ.

$V_i \cdot G_1 + V_2(sC + G_2) + V_o \cdot G_3 = 0$

$V_2 \cdot G_3 = -V_3 \cdot sC \;;\; V_2 = -\frac{sC}{G_3} \cdot V_3 \quad (2)$

$V_o \cdot G_4 = -V_3 \cdot G_4 \;;\; V_3 = -V_o \quad (3)$

(3) en (2) $\rightarrow$ $V_2 = +\frac{sC}{G_3} \cdot +V_o \quad (4)$

(4) en (1) $\rightarrow$ $V_i \cdot G_1 + \frac{sC}{G_3} \cdot V_o (sC + G_2) + V_o \cdot G_3 = 0$

$V_i G_1 + V_o \left(\frac{s^2C^2}{G_3} + \frac{sCG_2}{G_3} + G_3 \right) = 0$

$V_i G_1 + V_o \frac{s^2C^2 + sCG_2 + G_3^2}{G_3} = 0$

$\frac{V_o}{V_i} = -\frac{G_1 G_3}{s^2C^2 + sCG_2 + G_3^2}$

NOTA

HOJA Nº

FECHA

$$T(\$) = \frac{V_o}{V_i} = \frac{-G_1 G_3}{\$^2 C^2 + \$ C G_2 + G_3^2} = \frac{-G_1 G_3}{C^2\left(\$^2 + \$ \cdot \frac{G_2}{C} + \frac{G_3^2}{C^2}\right)}$$

$$T(\$) = -\frac{1}{C^2 R_1 R_3} \cdot \frac{1}{\$^2 + \$ \cdot \frac{1}{C R_2} + \frac{1}{C^2 R_3^2}}$$

ω_o

$$T(\$) = \frac{-1}{C R_1} \cdot \frac{1/CR_3}{\$^2 + \$ \cdot \left(\frac{1}{CR_2}\right) + \left(\frac{1}{C^2 R_3^2}\right)} \quad ; \quad \frac{\omega_o}{\varphi}$$

ω_o^2

ω_o/φ

$$\boxed{T(\$) = -\frac{1}{CR_1} \cdot \frac{\omega_o}{\$^2 + \$\frac{\omega_o}{\varphi} + \omega_o^2} \; ; \; \omega_o = \frac{1}{CR_3}}$$

2) $\omega_o = \frac{1}{C \cdot R_3}$, $\omega_o = 1 \Rightarrow 1 = \frac{1}{CR_3}$; $\underline{R_3 = \frac{1}{C}}$

$\frac{\omega_o}{\varphi} = \frac{1}{CR_2}$, $\omega_o = 1$; $\varphi = 3 \Rightarrow \frac{1}{3} = \frac{1}{CR_2}$; $\underline{R_2 = \frac{3}{C}}$

Adopto $\underline{C = 100\ \mu F} \Rightarrow \underline{R_3 = 10k\Omega} \Rightarrow \underline{R_2 = 30k\Omega}$

R_4 no incluye en la transferencia → Adopto $\underline{R_4 = R_3 = 10k\Omega}$

$$\Rightarrow \boxed{\begin{array}{l} C = 100\ \mu F \\ R_2 = 30k\Omega \\ R_3 = R_4 = 10k\Omega \end{array}}$$

3) $|T(0)| = 20dB$; $|T(\phi)|_{dB} = 20 \log |T(\phi)|$,

$|T(\phi)| = 10^{\frac{|T(\phi)|_{dB}}{20}} = 10^{\frac{20}{20}} \Rightarrow \underline{|T(\phi)| = 10}$

$|T(\phi)| = \frac{1}{C \cdot R_1} \cdot \frac{1}{\omega_o}$; $R_1 = \frac{1}{|T(\phi)| \cdot C \cdot \omega_o}$, Manteniendo valores del punto anterior

$$\Rightarrow \boxed{R_1 = 1k\Omega}$$

NOTA