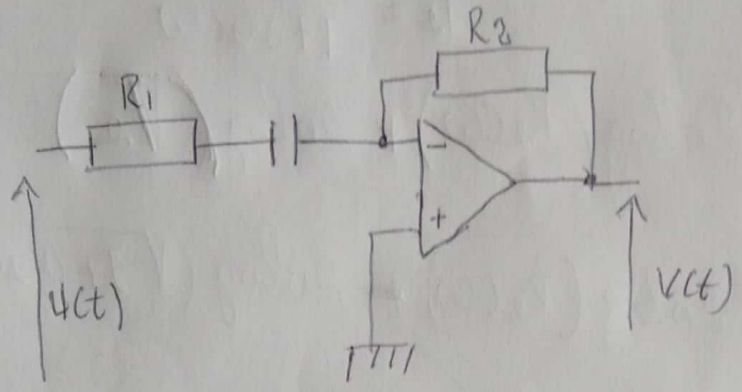
TAGHE
LEGHEL

Exercice 1



1- Etablir $\underline{T}$ AOP idéal et CR < 0
donc $V^+ = V^-$
et $i^+ = i^- = 0$

$$i_1 = \frac{u(t) - V^-}{R_1 + Z_c} = \frac{V^- - V(t)}{R_2}$$

$$\frac{u(t)}{R_1 + Z_c} = -\frac{V(t)}{R_2}$$

$$\frac{V(t)}{u(t)} = -\frac{R_2}{R_1 + Z_c}$$

$$\frac{V(t)}{u(t)} = \frac{-R_2}{R_1 + \frac{1}{j C\omega}}$$

$$V(t) = \frac{-R_2}{\frac{R_1 j C\omega + 1}{j C\omega}}$$

$$V(t) = \frac{-\frac{R_2}{j C\omega}}{1 + j R_1 C\omega}$$

$$\underline{T} = -\frac{R_2 j C\omega}{j C\omega} \times \frac{1}{1 + j R_1 C\omega}$$

2- Expression du Gain

$$G_V = 20\log(|\underline{T}|)$$

$$G_V = 20\log\left(\sqrt{\frac{R_2C\omega}{}}\right)$$

$$T_1 = \frac{1}{1+jR_1C\omega}$$

$$G_V = 20\log(R_2C\omega) + 20\log(T_2)$$

$$G_V = 20\log(R_2C\omega) - 20\log\left(\sqrt{1+(R_1C\omega)^2}\right)$$

3- Calcul de ω_c

définition $A_V = \frac{A_{V\max}}{\sqrt{2}}$ ou $A_{V\min} \times \sqrt{2}$

$$A_V = R_2C\omega \times \frac{1}{\sqrt{1+(R_1C\omega)^2}}$$

Pour $\omega = 0$ $A_V = 0 \Rightarrow G_V = -\infty$

Pour $\omega = +\infty$ $A_V = \frac{R_2}{R_1}$ $G_V = 20\log\left(\frac{R_2}{R_1}\right)$

$$\frac{R_2C\omega_c}{\sqrt{1+(R_1C\omega_c)^2}} = \frac{\frac{R_2}{R_1}}{\sqrt{2}}$$

$$R_2C\omega_c\sqrt{2} = \frac{R_2}{R_1}\sqrt{1+(R_1C\omega_c)^2}$$

$$R_2C\omega_c\sqrt{2} = \frac{R_2}{R_1}(R_1C\omega_c)$$

$$2R_2C\omega_c - \frac{R_2}{R_1}C\omega_c = 0$$

$$R_2 C\omega_c \sqrt{2} = \frac{R_2}{R_1}\sqrt{(R_1 C\omega_c)^2 + 1}$$

$$C\omega_c \sqrt{2} = \frac{\sqrt{(R_1 C\omega_c)^2 + 1}}{R_1}$$

$$2(C\omega_c)^2 = \frac{R_1 C\omega_c^2 + 1}{R_1^2}$$

$$2R_1^2(C\omega_c)^2 = (R_1 C\omega_c)^2 + 1$$

$$(R_1 C\omega_c)^2 = 1$$

$$\boxed{C\omega_c = \frac{1}{R_1 C}}$$

4 - Coef maximum 2

$$A_{max} = \frac{R_2}{R_1}$$

$$2 = \frac{R_2}{R_1}$$

$$\boxed{R_1 = \frac{R_2}{2}}$$

$R_1 = 1,65$

5 - Calcul de C

$$\omega_c = \frac{1}{R_1 C}$$

$$2\pi f_c = \frac{1}{R_1 C}$$

$$R_1 C = \frac{1}{2\pi f_c}$$

$$C = \frac{1}{2\pi f_c R_1}$$

$$C = \frac{1}{2\pi \times 160 \times 1,65}$$

$$C = \underline{0,0006\,F}$$

6- Representation