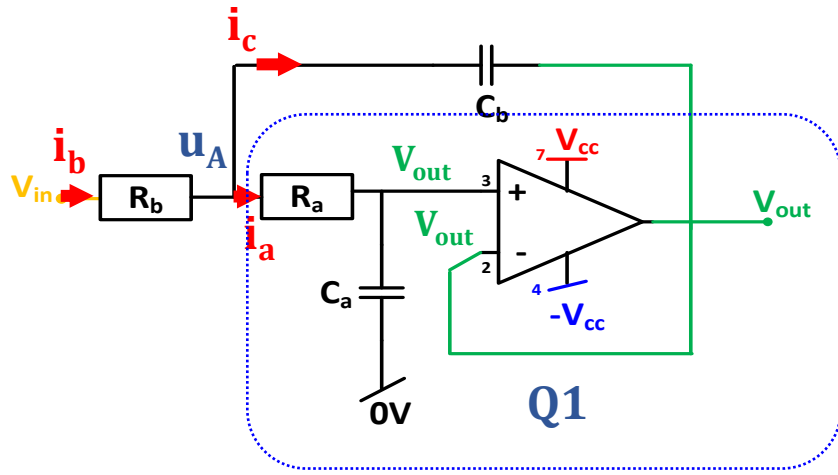




- cas particulier $C_a = C_b = C$ et $R_a = R_b = R$
- Q1: montage sans R_b et C_b : donner $\underline{H}_1(j\omega)$ et son digramme de Bode ?

$$\underline{H}_1(j\omega) = \frac{V_{out}}{U_A} = \frac{Z_{Ca}}{Z_{Ca} + R_a} = \frac{Z_C}{Z_C + R} = \frac{1}{1 + j\omega \underbrace{RC}_{1/\omega_p}}$$

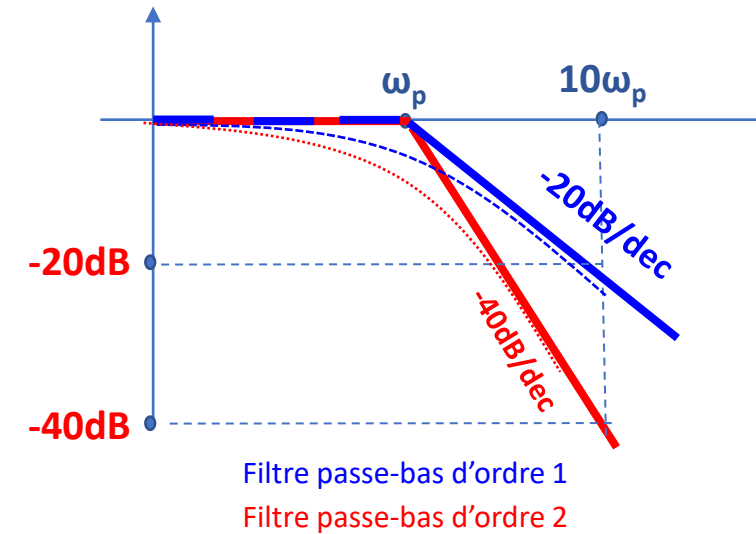
Q2: montage avec R_b et C_b : donner $\underline{H}(j\omega)$ et son digramme de Bode ?

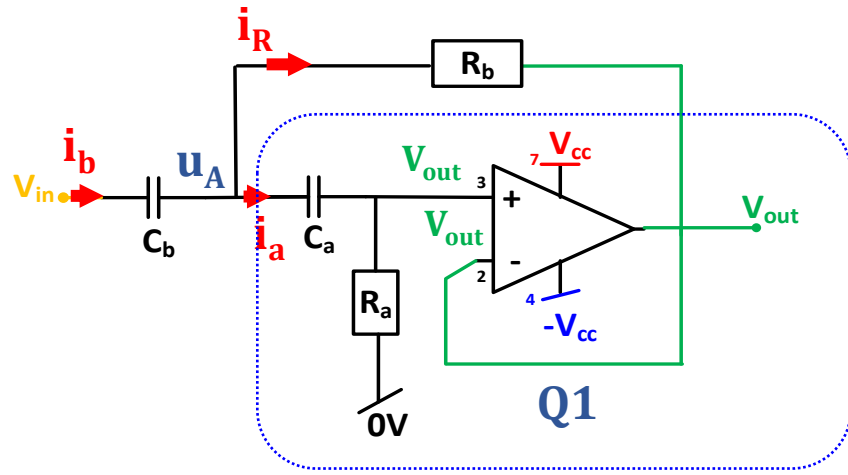
$$\underline{H}(j\omega) = \frac{V_{out}}{V_{in}} = \frac{V_{out}}{u_A} \frac{u_A}{V_{in}} = \underline{H}_1(j\omega) \underbrace{\frac{u_A}{V_{in}}}_{?}$$

$$i_b = i_a + i_c \rightarrow \frac{V_{in} - u_A}{R} = \frac{u_A - V_{out}}{R} + \frac{u_A - V_{out}}{Z_C}$$

$$\rightarrow \frac{V_{in}}{u_A} = 2 - \underbrace{\frac{V_{out}}{u_A}}_{\frac{Z_C}{Z_C + R}} \left(1 + \frac{R}{Z_C} \right) + \frac{R}{Z_C} \rightarrow \frac{u_A}{V_{in}} = \frac{Z_C}{Z_C + R}$$

$$\rightarrow \underline{H}(j\omega) = \frac{V_{out}}{V_{in}} = \left(\frac{Z_C}{Z_C + R} \right)^2 = \frac{1}{(1 + j\omega RC)^2}$$





- cas particulier $C_a = C_b = C$ et $R_a = R_b = R$
- Q1: montage sans R_b et C_b : donner $\underline{H}_1(j\omega)$ et son digramme de Bode ?

$$\underline{H}_1(j\omega) = \frac{V_{out}}{U_A} = \frac{R_a}{R_a + Z_{Ca}} = \frac{R}{R + Z_c} = \frac{j\omega \widetilde{RC}}{1 + j\omega \underbrace{RC}_{1/\omega_p}} \quad \begin{matrix} 1/\omega_z \\ 1/\omega_p \end{matrix}$$

Q2: montage avec R_b et C_b : donner $\underline{H}(j\omega)$ et son digramme de Bode ?

$$\underline{H}(j\omega) = \frac{V_{out}}{V_{in}} = \frac{V_{out}}{u_A} \frac{u_A}{V_{in}} = \underline{H}_1(j\omega) \underbrace{\frac{u_A}{V_{in}}}_{?}$$

$$i_b = i_a + i_c \rightarrow \frac{V_{in} - u_A}{Z_c} = \frac{u_A - V_{out}}{Z_c} + \frac{u_A - V_{out}}{R}$$

$$\rightarrow \frac{V_{in}}{u_A} = 2 - \underbrace{\frac{V_{out}}{u_A}}_{\frac{R}{R+Z_c}} \left(1 + \frac{Z_c}{R}\right) + \frac{Z_c}{R} \rightarrow \frac{u_A}{V_{in}} = \frac{R}{R+Z_c}$$

$$\rightarrow \underline{H}(j\omega) = \frac{V_{out}}{V_{in}} = \left(\frac{R}{R+Z_c}\right)^2 = \left(\frac{j\omega RC}{1+j\omega RC}\right)^2$$

