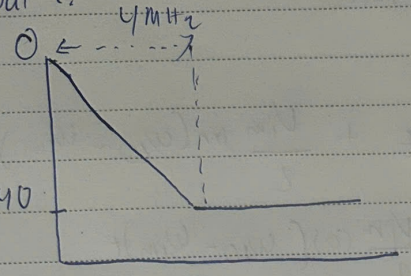
Bài 1:




$\Delta A = -40dB$

$\Delta f = \log_{10}\left(\frac{254}{250}\right) \approx 0,007$

$\Rightarrow$ Độ dốc $= \frac{-40}{0,007} = -5700 dB/decade$

$$A(f) = 10 \log 10 \left(1 + \left(\frac{f}{f_c}\right)^{2n}\right)$$

$A = 40dB$

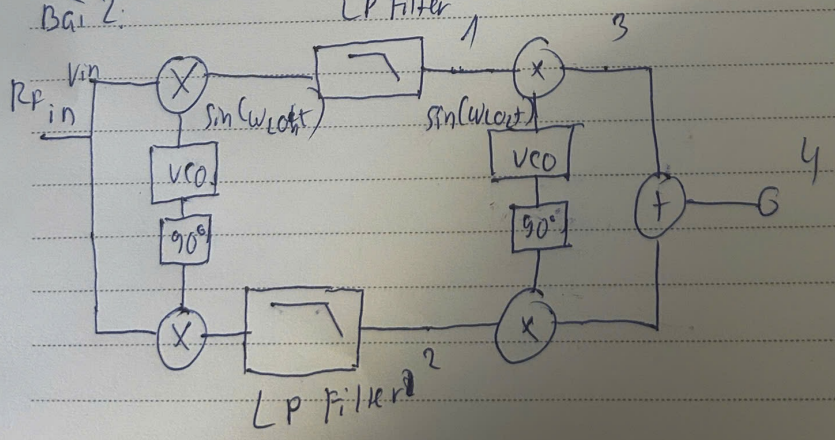
$\frac{f}{f_c} = \frac{254}{250} = 1,0016$

$\Rightarrow 40 = 10 \log_{10}(1 + 1,016^{2n})$

$\Rightarrow 2n \approx 290$

bậc bộ lọc rất lớn

Bài 2:



$V_{in} = V_{RF}\cos\omega_{RF}t + V_{im}\cos\omega_{im}t$

$\omega_{RF} > \omega_{LO}$

$V_1 = \frac{V_{RF}}{2}\sin(\omega_{RF} - \omega_{LO})t + \frac{V_{im}}{2}\sin(\omega_{LO} - \omega_{im})t$

$V_2 = \frac{V_{RF}}{2}\cos(\omega_{RF} - \omega_{LO})t + \frac{V_{im}}{2}\cos(\omega_{LO} - \omega_{im})t$

$V_3 = \frac{V_{RF}}{4}\cos(\omega_{RF} - \omega_{LO1} - \omega_{LO2})t - \frac{V_{im}}{4}\cos(\omega_{LO1} - \omega_{im} - \omega_{LO2})t$

Ngõ ra nhánh dưới:

$\frac{V_{RF}}{4}\cos(\omega_{RF} - \omega_{LO1} - \omega_{LO2}) + \frac{V_{in}}{4}\cos(\omega_{LO1} - \omega_{in} - \omega_{LO2})$

$V_4 = \frac{V_{RF}}{2}\cos(\omega_{RF} - \omega_{LO1} - \omega_{LO2})t = V_{out}$