EC2272 ANÁLISIS DE CIRCUITOS II – FORMULARIO N° 3

RESPUESTA EN FRECUENCIA

$H_V(f)=\dfrac{\mathbf{V}_{\text{sal}}(f)}{\mathbf{V}_{\text{ent}}(f)}$	$H_I(f)=\dfrac{\mathbf{I}_{\text{sal}}(f)}{\mathbf{I}_{\text{ent}}(f)}$	$H(f)=\lvert H(f)\rvert\, e^{j\phi(f)}$
$Z_L(s) = sL$ $Z_C(s) = 1/(sC)$	$G_P(\text{dB})=10\log\left(\dfrac{P_{\text{sal}}(f)}{P_{\text{ent}}(f)}\right)$	$G_V(\text{dB})=20\log\lvert H_V(f)\rvert$ $G_I(\text{dB})=20\log\lvert H_I(f)\rvert$

APROXIMACIONES ASINTÓTICAS DE BODE

$$20\log\left\{\left(\sqrt{1+(\omega/\omega_c)^2}\right)^{\pm n}\right\}\approx\begin{cases}0\text{ dB, si }\omega\le\omega_c\\ \pm 20n\log(\omega/\omega_c)\text{, si }\omega\ge\omega_c\end{cases};\ G(\omega_c)_{\text{dB}}=\pm 3n$$

$$20\log\left\{\left|1+2\zeta\left(j\frac{\omega}{\omega_0}\right)+\left(j\frac{\omega}{\omega_0}\right)^2\right|^{\pm n}\right\}\approx\begin{cases}0\text{ dB, si }\omega\le\omega_0\\ \pm 40n\log(\omega/\omega_c)\text{, si }\omega\ge\omega_0\end{cases};\ G(\omega_0)_{\text{dB}}=\pm 20n\log(2\zeta)$$

$$\arg\left\{\left[1+(j\omega/\omega_c)\right]^{\pm n}\right\}\approx\begin{cases}0^\circ\text{, si }\omega\le\omega_c/10\\ \pm n45^\circ\log(\omega/\omega_c)\text{, si }\omega_c/10\le\omega\le 10\omega_c\\ \pm n90^\circ\text{, si }\omega\ge 10\omega_c\end{cases}$$

$$\arg\left\{\left[1+2\zeta\left(j\frac{\omega}{\omega_0}\right)+\left(j\frac{\omega}{\omega_0}\right)^2\right]^{\pm n}\right\}\approx\begin{cases}0^\circ\text{, si }\omega\le\omega_0/10\\ \pm n90^\circ\log(\omega/\omega_c)\text{, si }\omega_0/10\le\omega\le 10\omega_0\\ \pm n180^\circ\text{, si }\omega\ge 10\omega_0\end{cases}$$

$\lvert H(\omega_2)\rvert_{\text{dB}}\approx\lvert H(\omega_1)\rvert_{\text{dB}}+m(\text{dB/déc})\cdot\log(\omega_2/\omega_1)$	$\phi(\omega_2)\approx\phi(\omega_1)+m(\text{grados/déc})\cdot\log(\omega_2/\omega_1)$

FILTROS

Filtro pasa-bajas ideal	**Filtro pasa-banda ideal**	**Filtro rechaza-banda ideal**
$\lvert H(f)\rvert=\begin{cases}1,\text{si }f\le f_0\\ 0,\text{si }f>f_0\end{cases}$ **Filtro pasa-altas ideal** $\lvert H(f)\rvert=\begin{cases}0,\text{si }f\le f_0\\ 1,\text{si }f>f_0\end{cases}$	$\lvert H(f)\rvert=\begin{cases}0,\text{si }f<f_1\\ 1,\text{si }f_1\le f\le f_2\\ 0,\text{si }f>f_2\end{cases}$	$\lvert H(f)\rvert=\begin{cases}1,\text{si }f\le f_1\\ 0,\text{si }f_1<f<f_2\\ 1,\text{si }f\ge f_2\end{cases}$
Filtro RC 1° orden $\omega_c=1/(RC)$ **Filtro RL 1° orden** $\omega_c=R/L$	**Circuito RLC serie** $\omega_0=1/\sqrt{LC}=\sqrt{\omega_1\omega_2}$ $AB=\omega_2-\omega_1=R/L$ $Q=\dfrac{\omega_0}{AB}=\dfrac{1}{R}\sqrt{\dfrac{L}{C}}=\dfrac{X(\omega_0)}{R}$	**Circuito RLC paralelo** $\omega_0=1/\sqrt{LC}=\sqrt{\omega_1\omega_2}$ $AB=\omega_2-\omega_1=1/(RC)$ $Q=\dfrac{\omega_0}{AB}=R\sqrt{\dfrac{C}{L}}=\dfrac{B(\omega_0)}{G}$

ESCALAMIENTO COMBINADO DE IMPEDANCIA Y FRECUENCIA, PASA- BAJAS Y PASA- ALTAS

$K_m=R'/R$	$K_f=\omega_0'/\omega_0=f_0'/f_0$	$L'=(K_m/K_f)L$	$C'=C/(K_mK_f)$

ESCALAMIENTO COMBINADO DE IMPEDANCIA Y FRECUENCIA, PASA-ALTAS ⇔ PASA-BAJAS

$K_m=R'/R$	$K_f=\omega_0'/\omega_0=f_0'/f_0$	$L'=K_m/(K_fC)$	$C'=1/(K_mK_fL)$