Modelagem

Prática I

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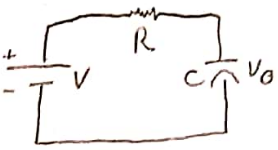
④ RC série



Foi calculado no roteiro 2:

$\tau = RC$

$t_s = 4\tau$

$t_r = 2{,}2\,\tau$

$$V_o(s) = \frac{V(s)\,.\,1/cs}{R + 1/cs}$$

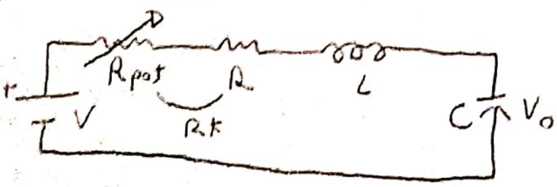
$$\frac{V_o(s)}{V(s)} = \frac{1/\cancel{cs}}{\frac{RCS+1}{\cancel{cs}}} \rightarrow \frac{V_o(s)}{V(s)} = \frac{1}{RCS+1} \quad (\div 1/RC)$$

$$\boxed{\frac{V_o(s)}{V(s)} = \frac{1/RC}{S + 1/RC}}$$

→ Calculo de τ, t_s (2%) e t_r (10% a 90%)

situação	R (Ω)	C (F)	τ	t_s	t_r
1	100	2,2μ	$0{,}22\times10^{-3}$	$0{,}88\times10^{-3}$	$0{,}484\times10^{-3}$
2	500	47μ	$23{,}5\times10^{-3}$	0,094	0,517
3	1000	100μ	0,1	0,4	0,22

⑤ RLC série



$$V_o(s) = \frac{V(s)\,\,1/cs}{R_t + LS + 1/cs}$$

$$\rightarrow \frac{V_o(s)}{V(s)} = \frac{1/c\cancel{s}}{\frac{R_tCS+LSCS+1}{\cancel{cs}}} \quad (\div 1/LC)$$

$$\frac{V_o(s)}{V(s)} = \frac{1/LC}{S^2 + R_tS/L + 1/LC}$$

→ Cálculo de ξ e ω_n em função de R, Rpot, L e C p/ cada um dos casos.

$$H(s) = \frac{K\omega_n}{s^2 + 2\xi\omega_n s + \omega_n^2} \qquad \omega_n = \frac{1}{\sqrt{LC}} \rightarrow \frac{1}{\sqrt{(1\times10^{-3})(1\times10^{-5})}}$$

$$\xi = \frac{R_T/L}{2\omega_n} \Rightarrow \frac{(R + R_{pot})/L}{2\omega_n}$$

situação	R(Ω)	Rpot(Ω)	L (H)	C (F)	ξ	ω_n
1	13	239	1 m	1 m	0,126	1×10^6
2	13	410	1 m	1 m	0,2115	1×10^6
3	13	660	1 m	1 m	0,3365	1×10^6
4	13	1400	1 m	1 m	0,7065	1×10^6
5	13	4700	1 m	1 m	2,3565	1×10^6