1

$$F(s) = \frac{s\left(\frac{s}{\omega_3} \pm 1\right) K}{\left(\frac{s}{\omega_1}+1\right)\cdot\left(\frac{s}{\omega_2}+1\right)}$$

$$F(\omega)\Big|_{\omega_1 < \omega < \omega_2} = \frac{\pm \omega K}{\frac{\omega}{\omega_1}} = \pm A \Rightarrow K = \pm \frac{A}{\omega_1}$$

$$F(s) = \pm \frac{A}{\omega_1} \cdot \frac{\left(\frac{s}{\omega_3} \pm 1\right) s}{\left(\frac{s}{\omega_1}+1\right)\left(\frac{s}{\omega_2}+1\right)}$$

2

1.

$$(V_0 - V_1) \cdot sC_1 + g_m V_1 + g_0 V_0 + sC_0 V_0 = 0$$

$$V_0 (sC_1 + sC_0 + g_0) = V_1 (sC_1 - g_m)$$

$$\frac{V_0}{V_1} = \frac{sC_1 - g_m}{s(C_1+C_0) + g_0}$$

2.

$$V_0(t) = A \left| \frac{j\omega_0 C_1 - g_m}{j\omega_0 (C_1 + C_0) + g_0} \right| \cdot \operatorname{sen}(\omega_0 t + \varphi) \quad A$$

$$\frac{j\omega_0 C_1 - g_m}{j\omega_0 (C_1+C_0) + g_0} = \frac{(j\omega_0 C_1 - g_m)\cdot(g_0 - j\omega_0(C_1+C_0))}{g_0^2 + \omega_0^2 (C_1+C_0)^2} =$$

$$\frac{j\omega_0 C_1 g_0 + g_m j\omega_0 (C_1+C_0) - g_0 g_m + \omega_0^2 (C_1+C_0) C_1}{g_0^2 + \omega_0^2 (C_1+C_0)^2}$$

$$\varphi = \operatorname{arctg}\left[\frac{\omega_0 (C_1 g_0 + g_m (C_1 + C_0))}{\omega_0^2 (C_1 + C_0) C_1 - g_m g_0}\right]$$

3.

$$V_0(s) = V_1(s) \frac{sC_1 - g_m}{s(C_1 + C_0) + g_0} = \frac{A\,\omega_0}{s^2 + \omega_0^2} \cdot \frac{sC_1 - g_m}{s(C_1 + C_0) + g_0} =$$

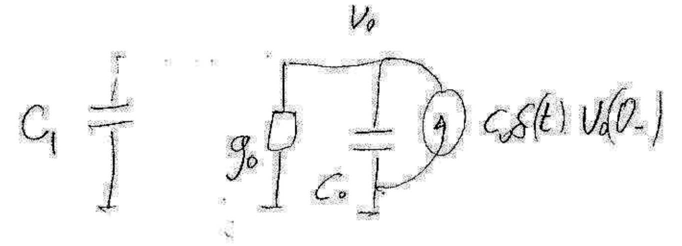
$$\underbrace{\frac{K_1}{s(C_1 + C_0) + g_0}}_{\text{transitório}} + \underbrace{\frac{K_2}{s + j\omega_0} + \frac{K_2^*}{s - j\omega}}_{\text{dão o regime permanente}}$$

$$K_1 = \frac{A\omega_0}{s^2 + \omega_0^2} (sC_1 - g_m)\Bigg|_{s = -\frac{g_0}{C_1 + C_0}} = -\frac{A\omega_0}{\left(\frac{-g_0}{C_1 + C_0}\right)^2 + \omega_0^2} \cdot \left(\frac{-g_0 C_1}{C_1 + C_2} - g_m\right)$$

Transitório

$$\mathcal{L}^{-1}\left(\frac{K_1}{s(C_1 + C_0) + g_0}\right) = \mathcal{L}^{-1}\left(\frac{K_1}{(C_1 + C_0)\left(s + \frac{g_0}{C_1 + C_0}\right)}\right) = \left(\frac{K_1}{C_1 + C_2}\right) \cdot e^{-\frac{g_0}{C_1 + C_0} t} \quad (B)$$

(4) Para condição inicial consideremos a fonte de corrente



SOMA-SE

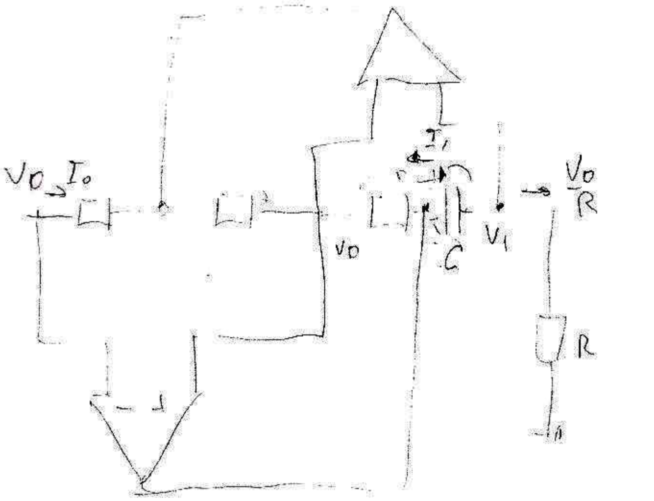
$\underline{(A) + (B) + (C)}$

$$V_0 (sC_1 + sC_0) + V_0 g_0 = C_0 V_0(0_-)$$

$$V_0 = \frac{C_0 V_0(0_-)}{s(C_1 + C_0) + g_0} \rightarrow V_0(t) = \frac{C_0}{C_1 + C_0} V(0_-) e^{-\frac{g_0}{C_1 + C_0} t} \quad (C)$$

3

2



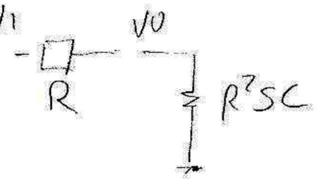
$V_0 \bullet R_1 I_1$

$= V_0 - \frac{V_0}{R^2SC} R_1$ $\qquad V_1 + \frac{V_0}{RSC}$

$$I_1 = \left(V_0 + \frac{V_0}{RSC} - V_0\right)\frac{1}{R} = \frac{V_0}{R^2SC}$$

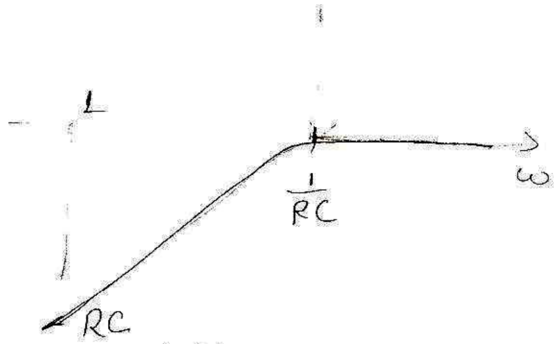
$$I_0 = \left(V_0 - V_0 + \frac{V_0 R_1}{R^2SC}\right)\frac{1}{R_1} = \frac{V_0}{R^2SC}$$

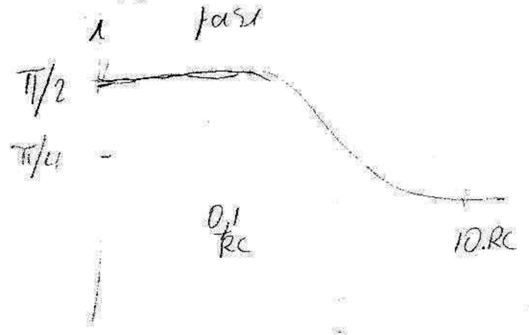
$$\boxed{\frac{V_0}{I_0} = R^2SC}$$



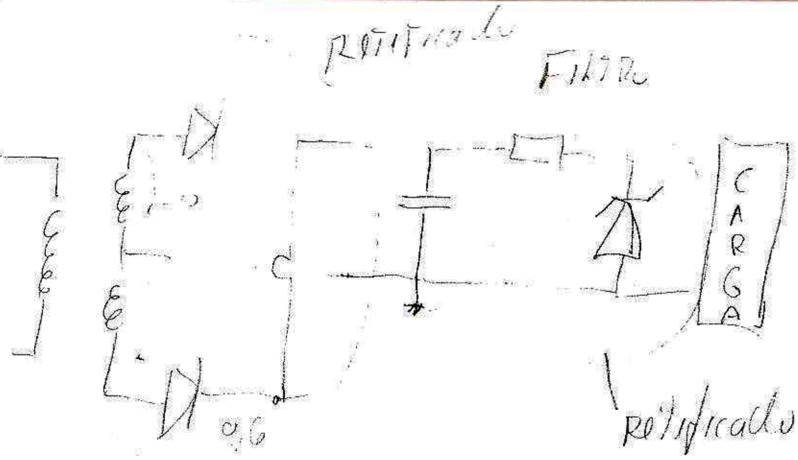
$$V_0 = \frac{R^2SC}{R + R^2SC} = \frac{RSC}{1+RSC}$$

| MODULO

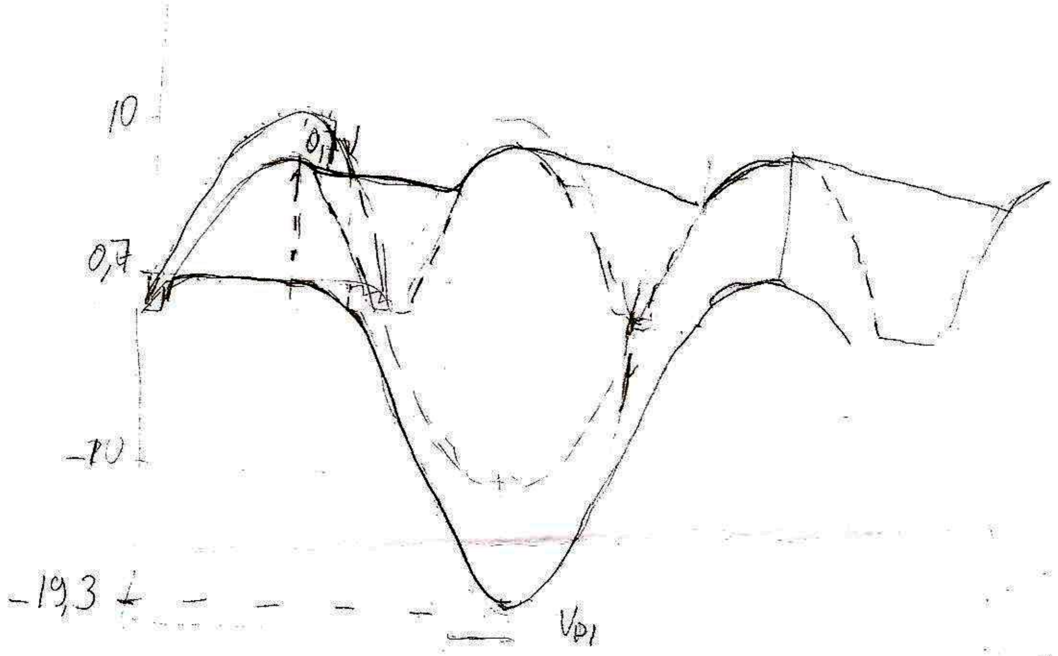




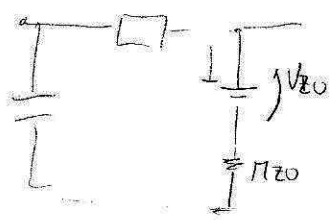
(4) (1)

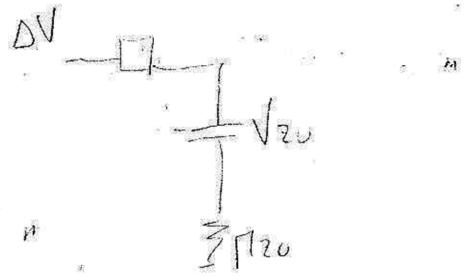


2



3.



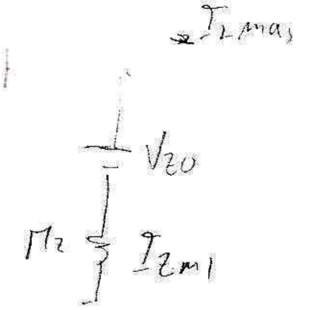


$$\Delta V \cdot C = I \cdot \frac{T}{2} = \left(\frac{9,3 - V_{Z0}}{R}\right) \cdot \frac{2\pi}{\omega\, 2} \Rightarrow$$

$$\boxed{\Delta V = \frac{(9,3 - V_{Z0}) \cdot \pi}{R C \omega}}$$

$$\boxed{\Delta V_0 = \left(\frac{\Delta V}{R + r_{Z0}}\right) \cdot r_{Z0}}$$

9,3 - 0,



$$\frac{9{,}2-(V_{Z0}+I_{Zmin}R_Z)}{R} \geq I_{Lmax}+I_{Zmin}$$

$$\boxed{R \leq \frac{9{,}2-(V_{Z0}+I_{Zmin}R_Z)}{I_{Lmax}+I_{Zmin}}}$$

5

1.