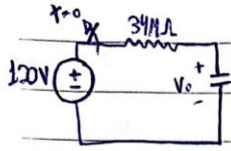
Daniel Augusto Müller. RA: 20398.34 Müller

1)

$V(t) = V_S + (V_0 - V_S)e^{-\frac{t}{\tau}}$ $\tau = R_{Th} \cdot C$



$t<0$ $t>0$

① $V_0 = 0V$ ② $V_\infty = 120V$

③ $\tau = R_{Th} \cdot C = 34M\Omega \cdot 15uF = 510$ seg

④ $V(t) = 120 + 120e^{-\frac{t}{510}}$

$85,6 = 120 + 120e^{-\frac{t}{510}}$

$e^{-\frac{t}{510}} = -0,286$

$\ln e^{-\frac{t}{510}} = \ln 0,286$

$\frac{-t}{510} = -1,245$ $t = 637,4$ seg

$V = \frac{S}{t} = \frac{4000}{637,4} = 6,27$ m/s

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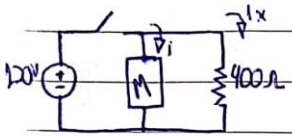
2)

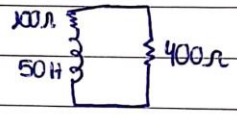


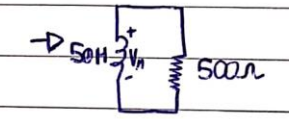
$L = 50H \quad R = 100\Omega$

$i(t) = i_0 e^{-\frac{t}{\tau}}$

$i(0^+) = i(0^-)$

$i_0 = \frac{V}{R} = \frac{120V}{100\Omega}$





$\tau = \frac{L}{R} = \frac{50}{500} = \frac{1}{10}$

$i_0 = 1,2A$

$V_M = V_R$

$50\frac{di}{dt} = 500$

$50\Gamma = 500 \quad \Gamma = 10$

p/ $t = 298ms$

$i(298ms) = 60,951mA$

$i(t) = 1,2e^{-10t}$

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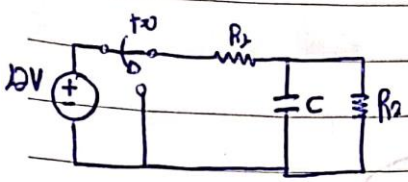
3)

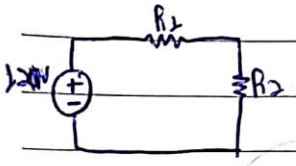


$R_1 = 6K\Omega \quad R_2 = 3K\Omega$

$C = 100\mu F$

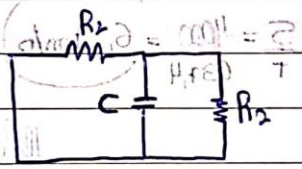
① $i(t) = i_0 e^{-\frac{t}{\tau}}$

$t < 0$



$$i_0 = \frac{V}{R_{eq}} = \frac{12V}{9K\Omega} = \frac{4}{3}mA$$

$t > 0$



$$R_{EQ} = \frac{R_1 . R_2}{R_1 + R_2} = 2K\Omega$$

$\tau = R_{TH} . C = 2K . 100\mu = 0,2D$

Substituindo em ①

$$\boxed{i(t) = \frac{4}{3} e^{-\frac{t}{0,2}} mA}$$

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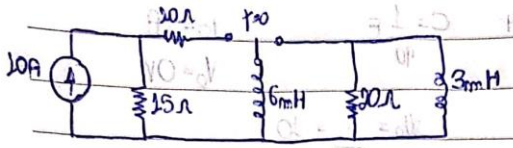
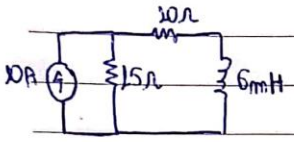
4)



$i(t) = i_0 e^{-\frac{t}{\tau}}$ $\tau = \frac{L}{R}$

$t < 0$



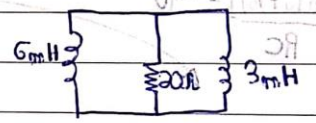
$i_0 = \frac{15}{15+20} \cdot (10A) = 6A$

Logo, $i(t) = 6e^{-10000t}$

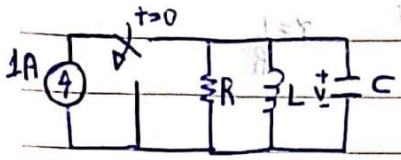
$t > 0$

$\tau = \frac{L}{R} = \frac{2mH}{20\Omega} = \frac{1}{10000}$

$L_{EQ} = 6 // 3 = 2mH$



5)



$R = 1\,\Omega$ $L = 0{,}4\,H$ $C = \frac{1}{40}\,F$ $i_0 = 1A$ $V_0 = 0V$

$\alpha = \frac{1}{2RC} = 20$ $\omega_0 = \frac{1}{\sqrt{LC}} = 10$

$\alpha > \omega_0$ Subamortecido

$S_{1,2} = -\alpha \pm \sqrt{\alpha^2 - \omega_0^2}$

$S_1 = -2{,}679$

$S_2 = -37{,}320$

$V(t) = K_1 e^{-2{,}679t} + K_2 e^{-37{,}32t}$

$V(0) = K_1 + K_2 = 0$

$\frac{dV(0)}{dt} = -2{,}679K_1 - 37{,}32K_2$

$\frac{dV(0)}{dt} = \left[\frac{-(Ri_0 + V_0)}{RC}\right] = -40$

$$\begin{cases} K_1 + K_2 = 0 \\ -2{,}679K_1 - 37{,}32K_2 = +40 \end{cases}$$

$$\begin{cases} 2{,}679K_1 + 2{,}679K_2 = 0 \\ -2{,}679K_1 - 37{,}32K_2 = -40 \end{cases}$$

$-34{,}641K_2 = -40$

$K_2 = 1{,}1547$ então $K_1 = -1{,}1547$

Logo,

$$\boxed{V(t) = -1{,}1547e^{-2{,}679t} + 1{,}1547e^{-37{,}32t}}$$