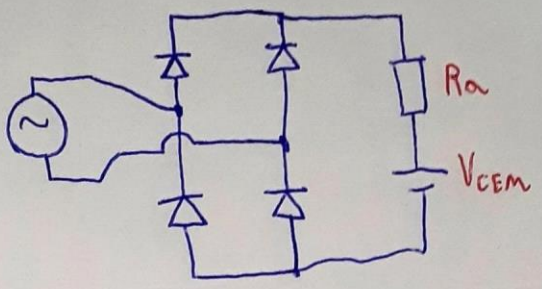
P1 - ELT 313 - 09/08/2021 - 96708 - Weirton Alves

Questão 2

$V_{rms_s} = 127\ V$

$R_a = 4\ \Omega$

$v_s = 127\sqrt{2}\,sen(\omega t)$



Devido V_{CEM} há um caso de corrente descontínua

a)

LKT (diodo ideal)

$$v_{s_p} - \cancel{v_d} - R I_p - V_{CEM} = 0 \rightarrow I_p = \frac{V_{sp} - V_{CEM}}{R} \rightarrow I_p = \frac{127\sqrt{2} - 118}{4} = 15{,}401\ A$$

Só há corrente na carga para valores: $v_s > V_{CEM}$

$$127\sqrt{2}\,sen(\omega t) - 118 = 0 \Rightarrow sen(\omega t) = \frac{118}{127\sqrt{2}} \Rightarrow \omega t = \begin{cases} \theta_1 = 0{,}717 \\ \theta_2 = 2{,}425 \end{cases}$$

$$V_{cc} = \frac{2}{2\pi}\int_{0,717}^{2,425} \left[V_p\,sen(\omega t) - V_{CEM}\right] d\omega t = \frac{1}{\pi}\left[-V_p\cos(\omega t)\Big|_{0,717}^{2,425} - 118\,t\Big|_{0,717}^{2,425}\right] =$$

$$V_{cc} = \frac{1}{\pi}\left[270{.}814 - 201{,}544\right] = 22{,}049\ V \rightarrow I_{cc} = \frac{V_{cc}}{R} = \frac{22{,}049}{4} = 5{,}512\ A$$

b) $V_{rms} = \sqrt{\frac{2}{2\pi}\int_{0,717}^{2,425} \left[V_p\,sen(\omega t) - 118\right]^2 d\omega t} = \sqrt{\frac{2}{2\pi} \cdot 3395{.}905} = \sqrt{540{.}475} = 32{,}878$

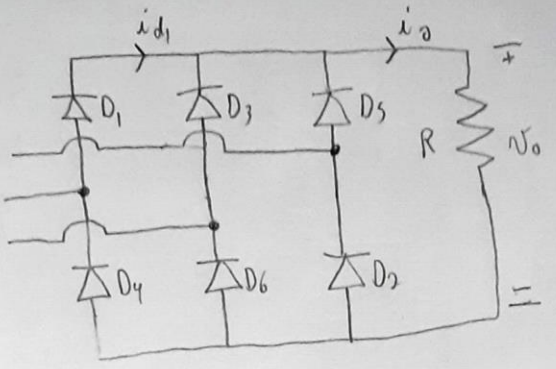
$$I_{rms} = \frac{V_{rms}}{R} = \frac{32{,}878}{4} = 8{,}219\ A$$

Questão 3

$R = 10\,\Omega$

$V_L = 220\ V$

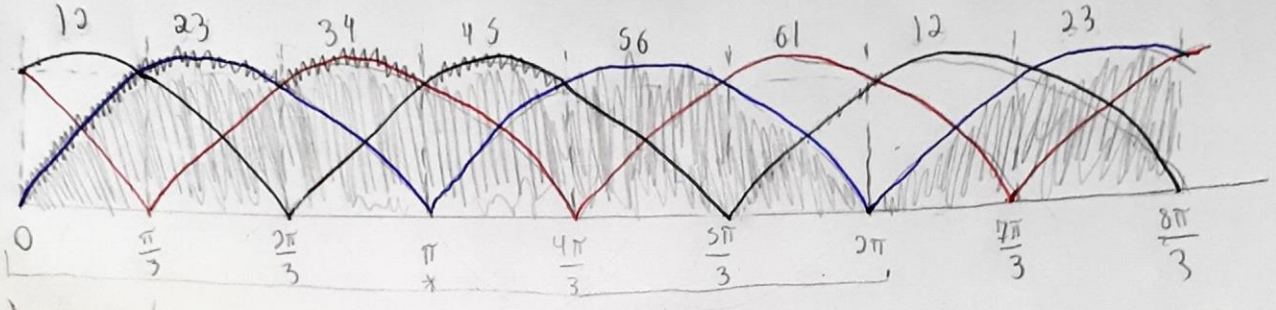
D1 - defeito



$V_P = 220\sqrt{2}$

$V_s = 220\sqrt{2}\,\mathrm{sen}(\omega t)$

* Simetria e o intervalo de π a $\frac{4\pi}{3}$ possui o mesmo distância $\frac{\pi}{3}$ a $\frac{2\pi}{3}$.



a)

$$V_{cc} \overset{*}{=} \frac{1}{2\pi}\left[\int_0^{\frac{2\pi}{3}} 2V_P\,\mathrm{sen}(\omega t)\,d\omega t + \int_{\frac{\pi}{3}}^{\frac{2\pi}{3}} 2V_P\,\mathrm{sen}(\omega t)\,d\omega t\right] = \frac{2V_P}{2\pi}\left[-\cos(\omega t)\Big|_0^{\frac{2\pi}{3}} - \cos(\omega t)\Big|_{\frac{\pi}{3}}^{\frac{2\pi}{3}}\right] =$$

$$V_{cc} = \frac{V_P}{\pi} \times \frac{5}{2} = 247,5871 \rightarrow I_{cc} = \frac{V_{cc}}{R} = 24,759 \approx 24,76\ A$$

b) A área de atuação do diodo D3 são as áreas 2-3 e 3-4, isto corresponde a metade da área total do gráfico acima (de acordo com a simetria)

$$V_{cc_{D_3}} = \frac{1}{2\pi}\left[\int_0^{\frac{2\pi}{3}} V_P\,\mathrm{sen}(\omega t)\,d\omega t + \int_{\frac{\pi}{3}}^{\frac{2\pi}{3}} V_P\,\mathrm{sen}(\omega t)\,d\omega t\right] = \frac{V_{cc}}{2} = 123,79\ V$$

$$I_{cc_{D_3}} = \frac{V_{cc_{D3}}}{R} = \frac{123,79}{10} = 12,379 \approx 12,38\ A$$

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