trabalho 1

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a) done

b) done

c) $\frac{2\pi}{3} \Rightarrow \frac{2\pi}{3} \times \frac{0,02}{2\pi} \cong 6,67 ms$

$V_c = \sqrt{2} \cdot \sqrt{3} \cdot 120 = 293,94$

d) $V_{av} = \frac{1}{\pi} \times \int_0^{\pi} V(\theta)\, d(\theta)$; $A = \sqrt{2} \cdot 120$

$$= \frac{1}{\pi} \left[\int_0^{\frac{\pi}{6}} A \cdot \sin\left(\theta - \frac{4\pi}{3}\right) + \int_{\frac{\pi}{6}}^{\frac{5\pi}{6}} A \cdot \sin(\theta) + \int_{\frac{5\pi}{6}}^{\frac{3\pi}{2}} A \cdot \sin\left(\theta - \frac{2\pi}{3}\right) + \int_{\frac{3\pi}{2}}^{2\pi} A \cdot \sin\left(\theta - \frac{4\pi}{3}\right) \right]$$

$$\underline{V_{av}} = 3 \times \frac{1}{\pi} \times \int_{\frac{\pi}{6}}^{\frac{5\pi}{6}} A \cdot \sin(\theta) = 140,3454 \ [V]$$

$$\underline{V_{rms}} = \sqrt{\frac{1}{\pi}} \times \sqrt{\int_0^{\pi} (V(\theta))^2 d\theta} \ ; \ A = \sqrt{2} \cdot 120$$

$$= \sqrt{\frac{1}{\pi}} \times \sqrt{\int_0^{\frac{\pi}{6}} \left(A \cdot \sin\left(\theta - \frac{4}{3}\right)\right)^2 + \int_{\frac{\pi}{6}}^{\frac{5\pi}{6}} (A \sin(\theta))^2 + \int_{\frac{5\pi}{6}}^{\frac{3\pi}{2}} \left(A \cdot \sin\left(\theta - \frac{2\pi}{3}\right)\right)^2 + \int_{\frac{3\pi}{2}}^{2\pi} \left(A \cdot \sin\left(\theta - \frac{4\pi}{3}\right)\right)^2}$$

$\cong 142,668 \ [V]$

c.a) $\sqrt{127890,1659} \cong 357,617$

$\sqrt{\frac{1}{2\pi}} \times 357,617 = 142,668 \ [V]$

V

$20354,35207$

$\sqrt{20354,35207} = 142,668 [V]$

$$V_{rms} = \sqrt{3 \times \frac{1}{\pi} \times \int_{\frac{\pi}{6}}^{\frac{5\pi}{6}} (A \cdot \sin(\theta))^2 d\theta}$$

$= 142,668679$

e) como se trata de uma carga puramente Resistiva $R = 500\ \Omega$ $Z = 500\ \Omega \angle 0$

$$A = \frac{\sqrt{2}\,120}{500} = 0,339411 \quad ; \quad \pi = 2\pi$$

$$I_{0av} = 3 \times \frac{1}{\pi} \times \int_{\frac{\pi}{6}}^{\frac{5\pi}{6}} A \cdot \sin(\theta)\, d\theta$$

$$= 0,28069$$

$$I_{0rms} = \sqrt{3 \times \frac{1}{\pi} \times \int_{\frac{\pi}{6}}^{\frac{5\pi}{6}} (A \cdot \sin(\theta))^2\, d\theta}$$

$$= 0,28533$$

Numa das fases

$$I_{1av} = \frac{1}{\pi} \int_{\frac{\pi}{6}}^{\frac{5\pi}{6}} A \cdot \sin(\theta)\, d\theta$$

$$= \frac{I_{0AV}}{3} = 0,09356$$

$$I_{1rms} = \sqrt{\frac{1}{\pi} \int_{\frac{\pi}{6}}^{\frac{5\pi}{6}} (A \cdot \sin(\theta))^2\, d\theta}$$

$$= 0,164739$$

f)

$$S_1 = U_{1rms} \times I_{1rms}$$

$$= \sqrt{\frac{1}{\pi} \times \int_{\frac{\pi}{6}}^{\frac{5\pi}{6}} (\sqrt{2} \cdot 120 \sin(\theta))^2\, d\theta} \times 0,164739$$

$$= 82,3698$$

$$= 120 \times 0,164739 = 19,768\ [VA]$$

$$P_1 = \frac{1}{\pi} \int_0^T V_1(\theta) \cdot I_1(\theta)\, dt = \frac{1}{\pi} \int_{\frac{\pi}{6}}^{\frac{5\pi}{6}} \sqrt{2} \cdot 120 \cdot \sin(\theta) \times \frac{\sqrt{2}\,120}{500} \sin(\theta)$$

$$= 13,5695$$

$$PF = \frac{P_1}{S_1} \approx 0,686437$$

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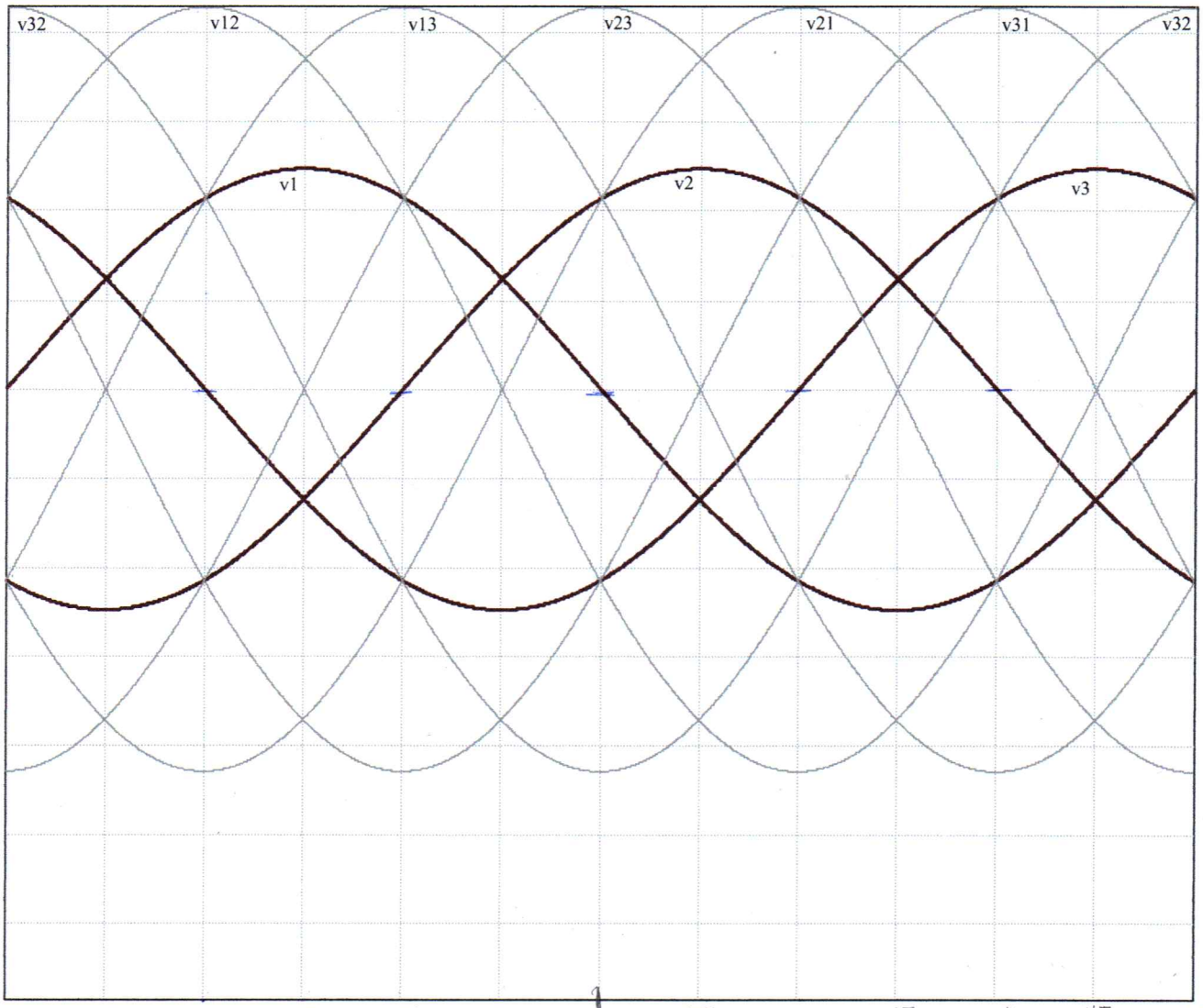

$\sqrt{1}$

$\frac{4\pi}{6} = \frac{2\pi}{3}$

46,78 $\sqrt{}$

$\sqrt{2}$

$\sqrt{3}$

$\sqrt{3}$

$I_{D\_max} = I_0$

$I_{D\_médio} = \frac{1}{T}\int_0^T i_D(t)\,dt = \frac{1}{T}\int_0^{\frac{T}{3}} I_0\,dt = \frac{I_0}{3}$

$I_{D\_rms} = \sqrt{\frac{1}{T}\int_0^T i_0(t)^2\,dt} = \sqrt{\frac{1}{T}\int_0^{\frac{T}{3}} I_0^2\,dt} = \frac{1}{\sqrt{T}} \times \frac{\sqrt{T}}{\sqrt{3}} I_0$

$= \frac{I_0}{\sqrt{3}}$

$V_{o\,max} = \sqrt{2}\,V_{rms}$

$V_{o\,min} = \frac{\sqrt{2}}{2}\,V_{rms}$

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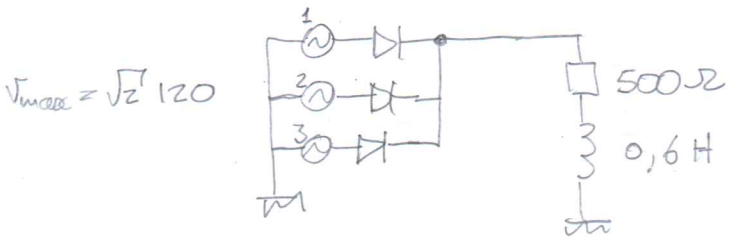

$X_L = 2\pi f L j$

$\cong 60\pi \cong 188,496$

$Z \cong 534,35 \angle 20,66°$

regime permanente

I(θ) = 0	time [sec]
0	0
2,9784	$9,43 \cdot 10^{-3}$
6,1201	0,0194
9,2616	0,0294

$\alpha = \frac{\pi}{6}$

etc

$$I_0 = \frac{V_{o\,médio} - E}{R}$$

$\Leftrightarrow$ RLE

i) tempo de condicção:

$$2,9784 \times \frac{0,02}{2\pi} = 9,48 \cdot 10^{-3}$$

tensão inversa max:

$V_{inv\,max} = \sqrt{2} \cdot \sqrt{3} \cdot 120 = 293,938$ [V]

j) considerando como carga indutiva $I_0 = \frac{V_{méd}}{R}$

$I_0 = I_{0\,méd}$

$= \frac{140,3454}{500}$

$\cong 0,2807$ [A]

Quando mais indutiva a carga a corrente torna-se quase constante, não existindo interrupções na condução do semicondutores.

P3

$$I_{D\text{-}max} = I_0$$

$$I_{D\text{-}médio} = \frac{1}{T}\int_0^T i_D(t)\,dt = \frac{1}{T}\int_0^{\frac{T}{3}} I_0\,dt = \frac{I_0}{3}$$

$$I_{D\text{-}rms} = \sqrt{\frac{1}{T}\int_0^T i_D(t)^2\,dt} = \sqrt{\frac{1}{T}\int_0^{\frac{T}{3}} I_0^2\,dt}$$

$$= \frac{1}{\sqrt{T}}\,\frac{\sqrt{T}}{\sqrt{3}}\,I_0 = \frac{I_0}{\sqrt{3}}$$

$$P = \frac{1}{T}\int_0^T v_D(t)\,i_D(t)\,dt = I_0\,\frac{1}{T}\int_0^T v_D(t)\,dt = I_0\,V_{D\text{-}médio}$$

$$S = 3\,V_{S\text{-}rms} \times I_{S\text{-}rms} = 3\,V_{rms}\,I_{D\text{-}rms} = 3V_{rms}\,\frac{I_0}{\sqrt{3}}$$

$$FP_S = \frac{I_0\,\frac{3}{\pi}\sqrt{2}\,V_{rms}\,\sin\left(\frac{\pi}{3}\right)}{3\,V_{rms}\,\frac{I_0}{\sqrt{3}}} = \frac{\sqrt{6}}{\pi}\,\sin\left(\frac{\pi}{3}\right)$$

$$= 0{,}675$$