ACCCV2E1

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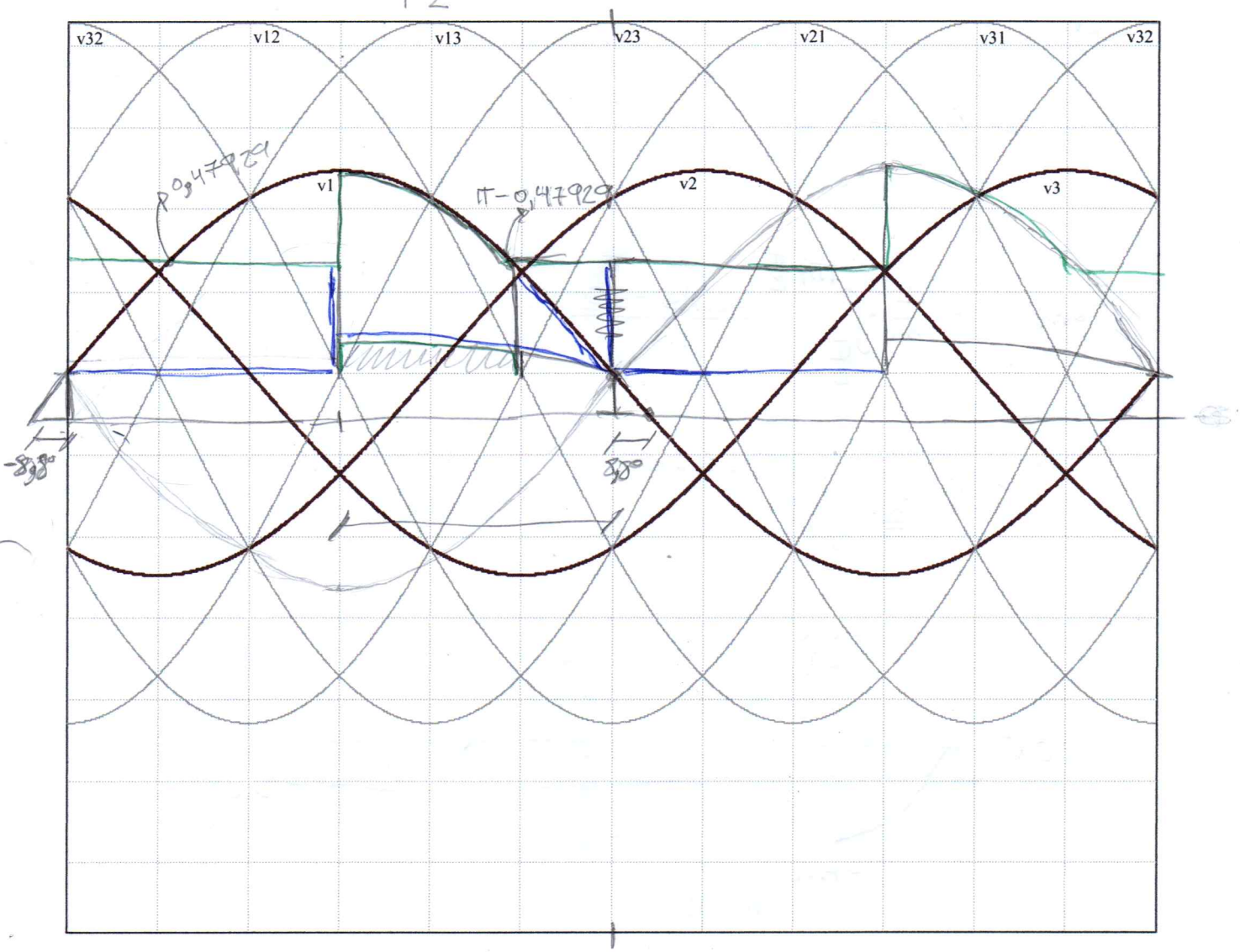
P2



i) R=10Ω - circuito resistivo $\quad A = \sqrt{2}.230 \; ; \; B = \frac{\sqrt{2}.230}{10}$

$$V_{oméd} = 2.\frac{1}{\pi}.\int_{\frac{\pi}{2}}^{\pi} A.\sin\theta \, d\theta = 103,5\ [V]$$

$$I_{oméd} = 2.\frac{1}{\pi}\int_{\frac{\pi}{2}}^{\pi} B.\sin\theta \, d\theta = 10,35[A]$$

$$P_o = 2.\frac{1}{\pi}\int_{\frac{\pi}{2}}^{\pi} A\sin(\theta) \times B\sin(\theta) = 2645\ [W]$$

ii) R=10Ω ; E=150V $\quad \alpha_{150volt} = 0,47929$ rad

$$V_{oméd} = \frac{1}{\pi}.\int_{0}^{\frac{\pi}{2}} 150 \, d\theta + \frac{1}{\pi}.\int_{\frac{\pi}{2}}^{\pi-0,47929} A\sin(\theta)\,d\theta + 0.\frac{1}{\pi}\int_{\pi-0,47929}^{\pi} 150 \, d\theta \; ; \; \pi = \pi$$

(75 // 91,86 // 22,88)

$$= 189,7448$$

$$I_{oméd} = \frac{1}{\pi}\int_{\frac{\pi}{2}}^{\pi-0,47929} \frac{V-E}{10} = 3,97545\ [A] \; ; \; V = A.\sin(\theta)$$

$$P = \frac{1}{\pi}\int_{\frac{\pi}{2}}^{\pi-0,47929} A.\sin\theta \times \frac{V-E}{10} \, d\theta = 1148,905$$

iii) $R = 10\ \Omega$ $E = -50V$ o circuito vai estar sempre em condução, pois tem sempre corrente a circular no circuito, como $\frac{\pi}{2}$ é certo a média é nula.

$$V_{0\,méd} = \frac{1}{2\pi}\int_0^{2\pi} A\,\mathrm{sen}(\theta)\,d\theta$$

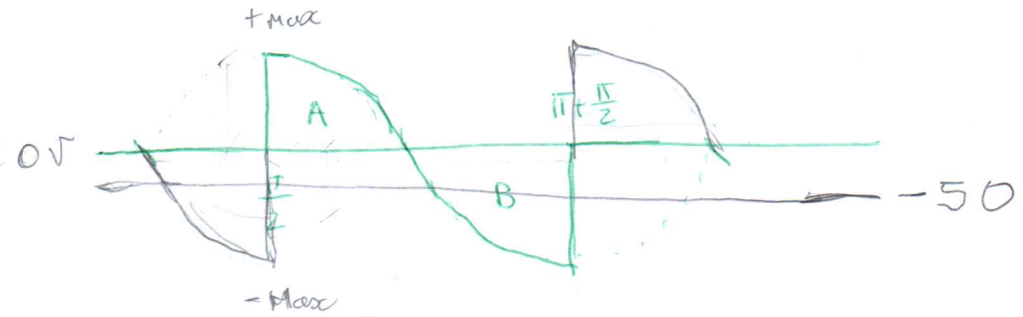
$$= \phi \quad [V]$$

$$P = \phi$$

$$I_{omléd} = \frac{1}{\pi}\cdot\int_{\frac{\pi}{2}}^{\pi+\frac{\pi}{2}} \frac{A\,\mathrm{sen}(\theta)+50}{10}$$

α - 50 Volt $= -0{,}15433$ rad

$\cong 8{,}8°$.



A = B

ACCCVCE2

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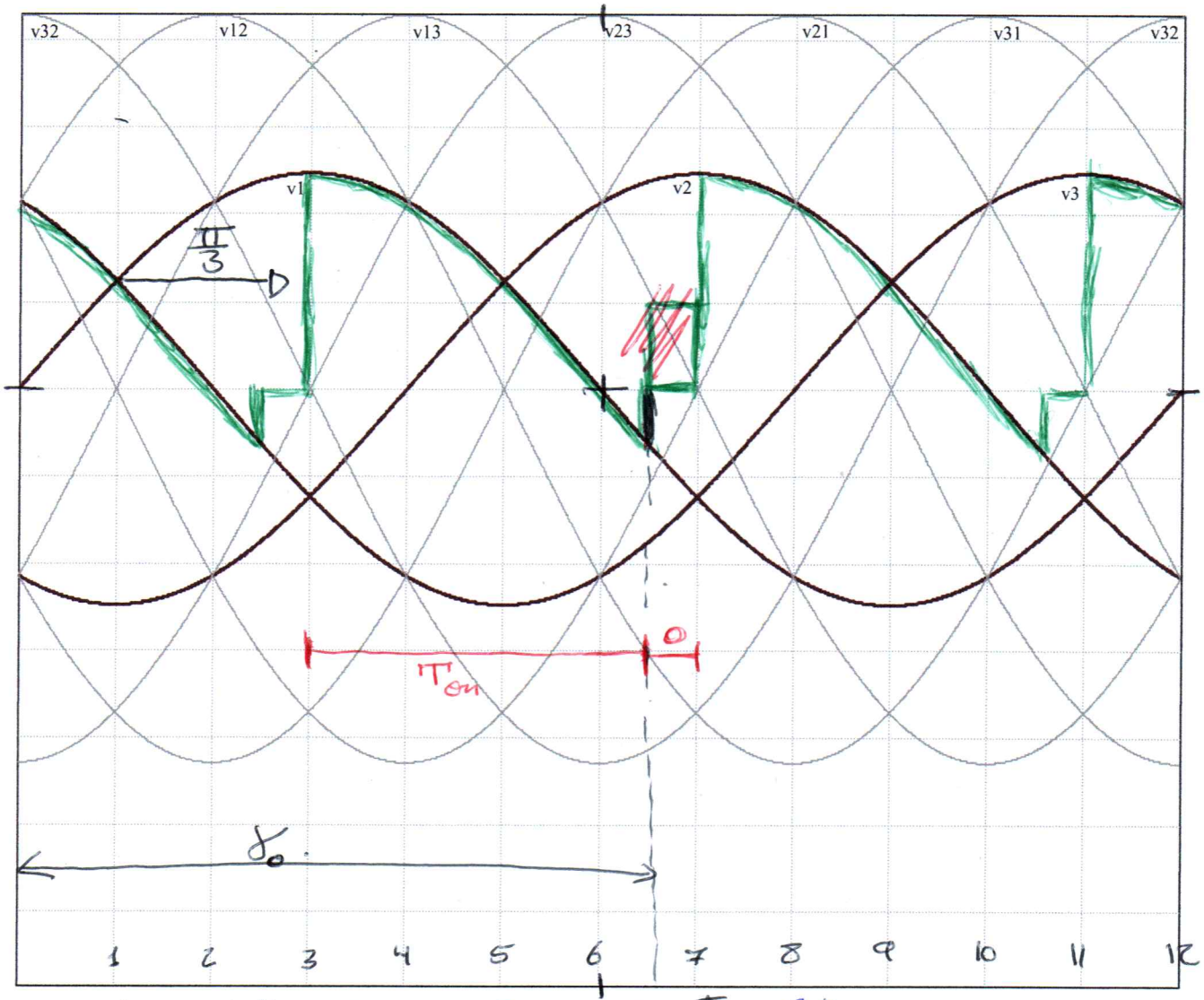

$L = 0{,}1\ H$; $R = 100\ \Omega$ e $\alpha = \frac{\pi}{3}$; $\begin{cases} \varnothing = 0{,}3043 \\ \alpha = \frac{\pi}{2} \\ WL = 31{,}415 \end{cases}$

$\gamma_o = 1{,}8727 + \frac{\pi}{2}$; $Z = 104.81$

$\approx 107{,}3° + \frac{\pi}{2} = 197{,}3$

$$V'_{o\,méd} = 3 \times \frac{1}{2\pi} \times \int_{\frac{\pi}{2}}^{\frac{\pi}{2}+1{,}8727} \sqrt{2}\cdot 230 \operatorname{sen}(\theta)\, d\theta + 0$$

$$= 148{,}2804 \ [V]$$

$$I_{1\,fase\,méd} = 0{,}49426 \ [A] \ [\text{'AVERAGE I'}]$$

$$\therefore I_{o\,méd} = 3 \times 0{,}49426 = 1{,}48278$$

$$P_{méd} = 3 \times \frac{1}{2\pi} \times \int_{0}^{1{,}8727} \sqrt{2}\,230 \operatorname{sen}(\theta+\alpha) \times \left[\frac{\sqrt{2}\cdot 230}{104{,}81} \operatorname{sen}\left(\frac{\pi}{2} - 0{,}3043\right) \times e^{\frac{100}{31{,}416}\theta} + \frac{\sqrt{2}\cdot 230}{104{,}81} \operatorname{sin}\left(\theta + \frac{\pi}{2} - 0{,}3043\right) \right]$$

$$= 299{,}416 \ [W]$$

CACCV2E2

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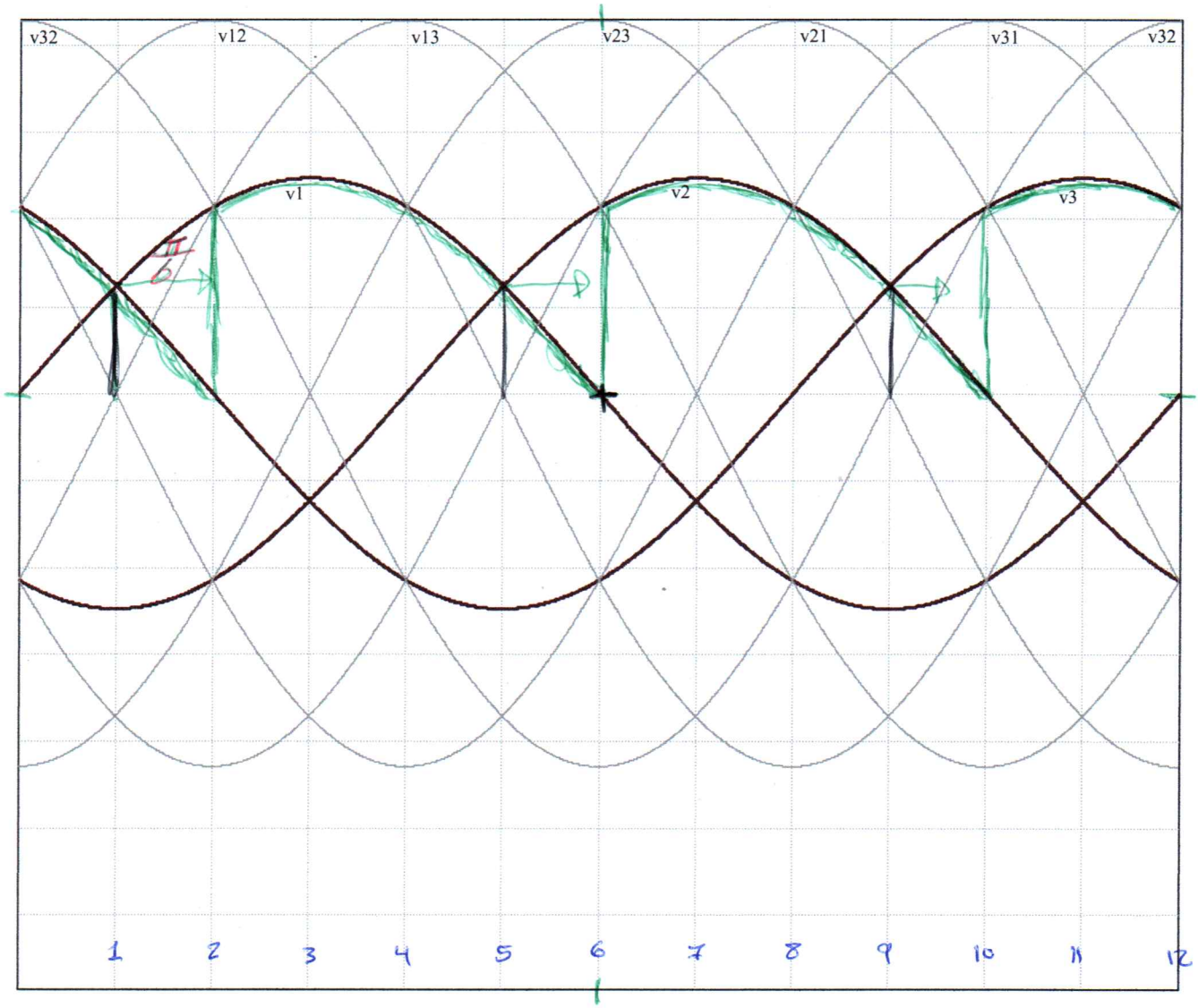


i)

$V_{oméd} = 3 \times \frac{1}{2\pi} \int_{\frac{\pi}{3}}^{\pi} A \cdot \operatorname{sen}(\theta)\, d\theta$; $A = \sqrt{2} \cdot 230$

$= 232,9568$ [V]

$I_o = 3 \times \frac{1}{2\pi} \int_{\frac{\pi}{3}}^{\pi} \frac{A \cdot \operatorname{sen}(\theta)}{100}\, d\theta$ $= 2,329$ [A]

$P = 3 \times \frac{1}{2\pi} \int_{\frac{\pi}{3}}^{\pi} A \cdot \operatorname{sen}(\theta) \cdot I_o\, d\theta$

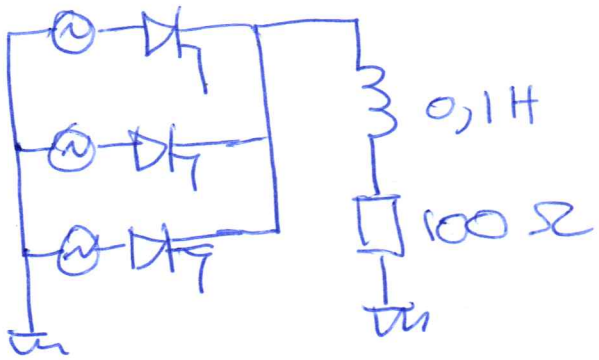
$= 3 \times I_o \times \frac{1}{2\pi} \times \int_{\frac{\pi}{3}}^{\pi} A \cdot \operatorname{sen}(\theta)\, d\theta$

$= 542,5564$ [W]

$FP = \frac{542,5564}{927,81}$

$= 0,5847$

CACCUZE 2 9i



$Z \tilde{=} 104{,}82 \measuredangle 17{,}4°$

$\measuredangle 0{,}304$ rad

$\alpha = \frac{\pi}{3}$

$\therefore \alpha_T = \frac{\pi}{6} + \frac{\pi \cdot 2}{6}$

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

$V'_{o\,méd} = 148{,}2804$ [V]

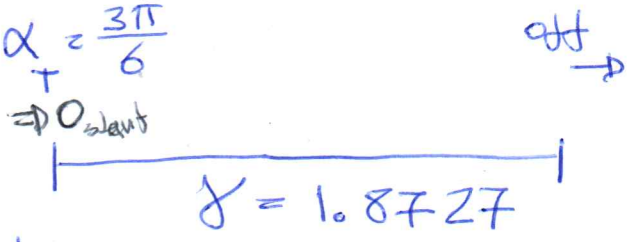
$I_{1\,fase\,méd} = 0{,}49426$ [A]

$I_{o\,méd} = 3 \times I_{1\,fase\,méd}$

$= 1{,}48278$ [A]

$P_{o\,méd} = 299{,}416$ [W]

$\alpha_T = \frac{3\pi}{6}$ ⇒ 0 atraso



trigger.

$S = ?$ $2 \times 230 \times I_{RMS}$ $\quad L=0 \quad H=1{,}8727.$

$V_{o\,médio} = \frac{V'_{o\,médio}}{\cos\alpha}$

$= 296{,}5608$ [V]

$FP = \frac{P}{S} \rightarrow ?$

ELTRP CACC 2 E2

$$i'_d(\theta) = \frac{230\sqrt{2}}{104,8}\left[\operatorname{sen}\left(\theta+\frac{\pi}{3}+\frac{\pi}{6}-0,3\right)-\operatorname{sen}\left(\frac{\pi}{3}+\frac{\pi}{6}-0,3\right)e^{-\frac{R}{\omega L}\theta}\right.$$

$i'_d(\theta) = 0 \Rightarrow \theta = 1,87\ rad = 107° < 120° \Rightarrow$ condução descontínua.

b) $V'_{do} = \frac{3}{2\pi}\int_{\frac{\pi}{2}}^{\frac{\pi}{2}+1,87} 230\sqrt{2}\operatorname{sen}\theta\, d\theta = 148,3V$ $I'_{méd} = \frac{148,3}{100}$

$= 1,48\ A$

c) $I'_{d_{rms}} = \sqrt{\frac{3}{2\pi}\int_0^{1,87} i'_d(\theta)^2\, d\theta} = 1,73A$

Power.

$P = 100 * 1,73^2$

$\approx 299,3\ W$

d) $I_{S_{rms}} = \sqrt{\frac{1}{2\pi}\int_0^{1,87} i'_d(\theta)^2\, d\theta} = 1,0\ A$ ZRSMI.

$S = 3.230 \times 1$

$= 690\ VA$

$FP = \frac{P}{S} = \frac{299,3}{690} = 0,434$

CACC V2 E3

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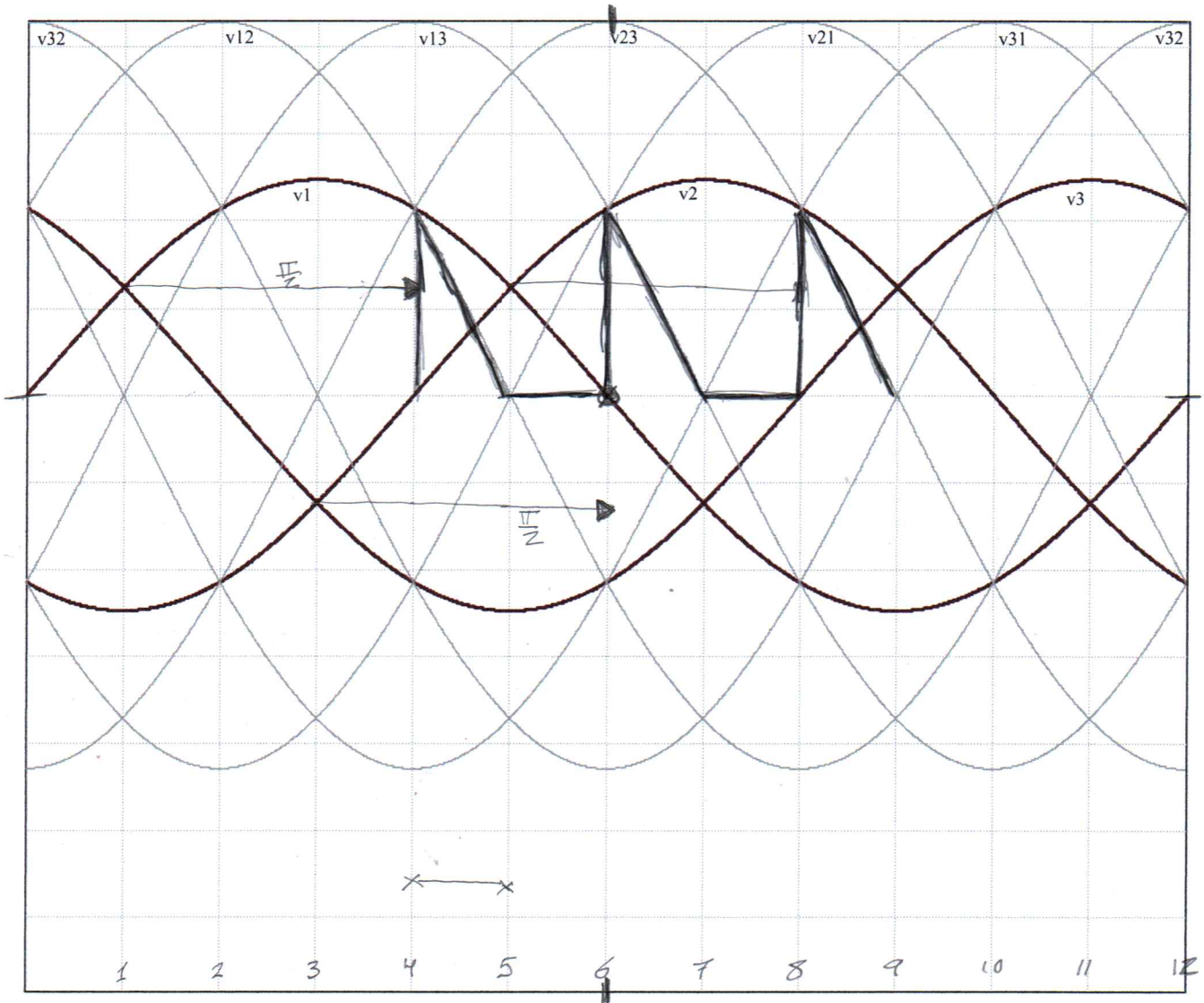

i) $\alpha = \frac{\pi}{2} \Rightarrow \alpha' = \frac{\pi}{2} + \frac{\pi}{6}$ $\quad R = 10\,\Omega$

- circuito puramente resistivo
- $\alpha > \frac{\pi}{3}$ ∴ com descontinuidade

$V_{12} = \sqrt{3}\sqrt{2}.230\,\mathrm{sen}(\theta + \frac{\pi}{6})$

$$V_{méd} = 6 \times \frac{1}{2\pi} \int_{\frac{4\pi}{6}}^{\frac{5\pi}{6}} \sqrt{3}.\sqrt{2}.230.\mathrm{sen}(\theta + \frac{\pi}{6})$$

$$= 72,077 \ [\mathrm{Volt}]$$

$$I_{méd} = 6 \times \frac{1}{2\pi} \int_{\frac{4\pi}{6}}^{\frac{5\pi}{6}} \frac{\sqrt{3}.\sqrt{2}.230\,\mathrm{sen}(\theta + \frac{\pi}{6})}{10} = 7,20 \ [\mathrm{A}]$$

★ No exame pode levar calculadora?

Ângulo de disparo é sempre a partir do cruzamento entre as fases.

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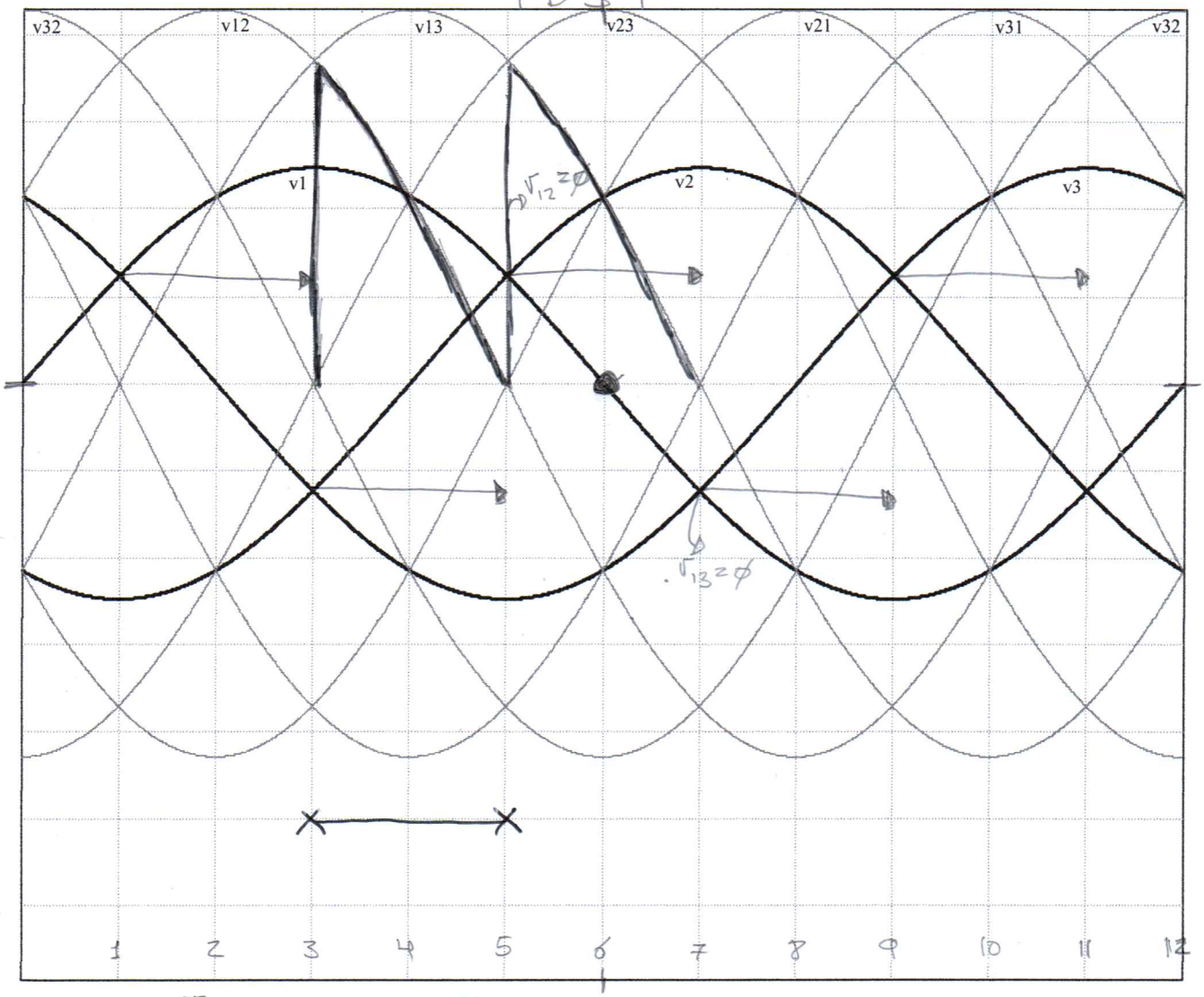
PD3T



ii) $\alpha = \frac{\pi}{3}$ $\alpha' = \frac{\pi}{6} + \frac{\pi}{3}$ $R = 10\,\Omega$

- circuito puramente Resistivo.

$v_{12} = \sqrt{3}.\sqrt{2}.230.\operatorname{sen}(\theta - \frac{\pi}{6})$

$\Rightarrow$ translação para a direita

$$V_{o\,méd} = 6 \times \frac{1}{2\pi} \int_{\frac{3\pi}{6}}^{\frac{5\pi}{6}} v_{12}\, d\theta$$

$$= 268,995$$

$$I_{o\,méd} = \frac{V_{o\,méd}}{10} = 26,865\ [A]$$

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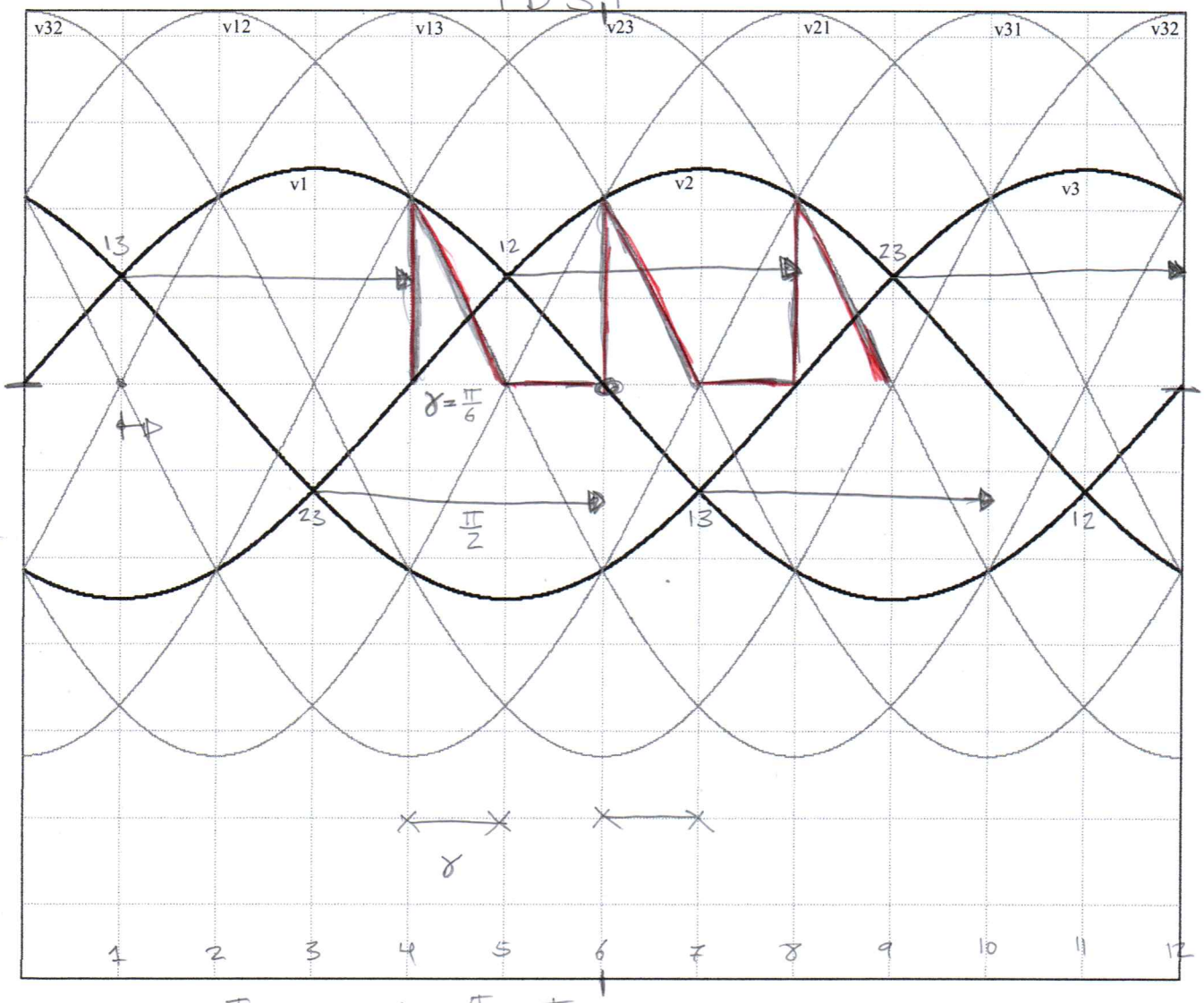
PD3T



iii) $\alpha = \frac{\pi}{2}$ $\alpha' = \frac{\pi}{2} + \frac{\pi}{6}$

* o Diodo freewheel não faz nada.

Igual a i) $V_{oméd} = 6 \times \frac{1}{2\pi} \int_{\frac{4\pi}{6}}^{\frac{5\pi}{6}} V_{12}\, d\theta = 72{,}077\,[V]$

CACCJ2E4

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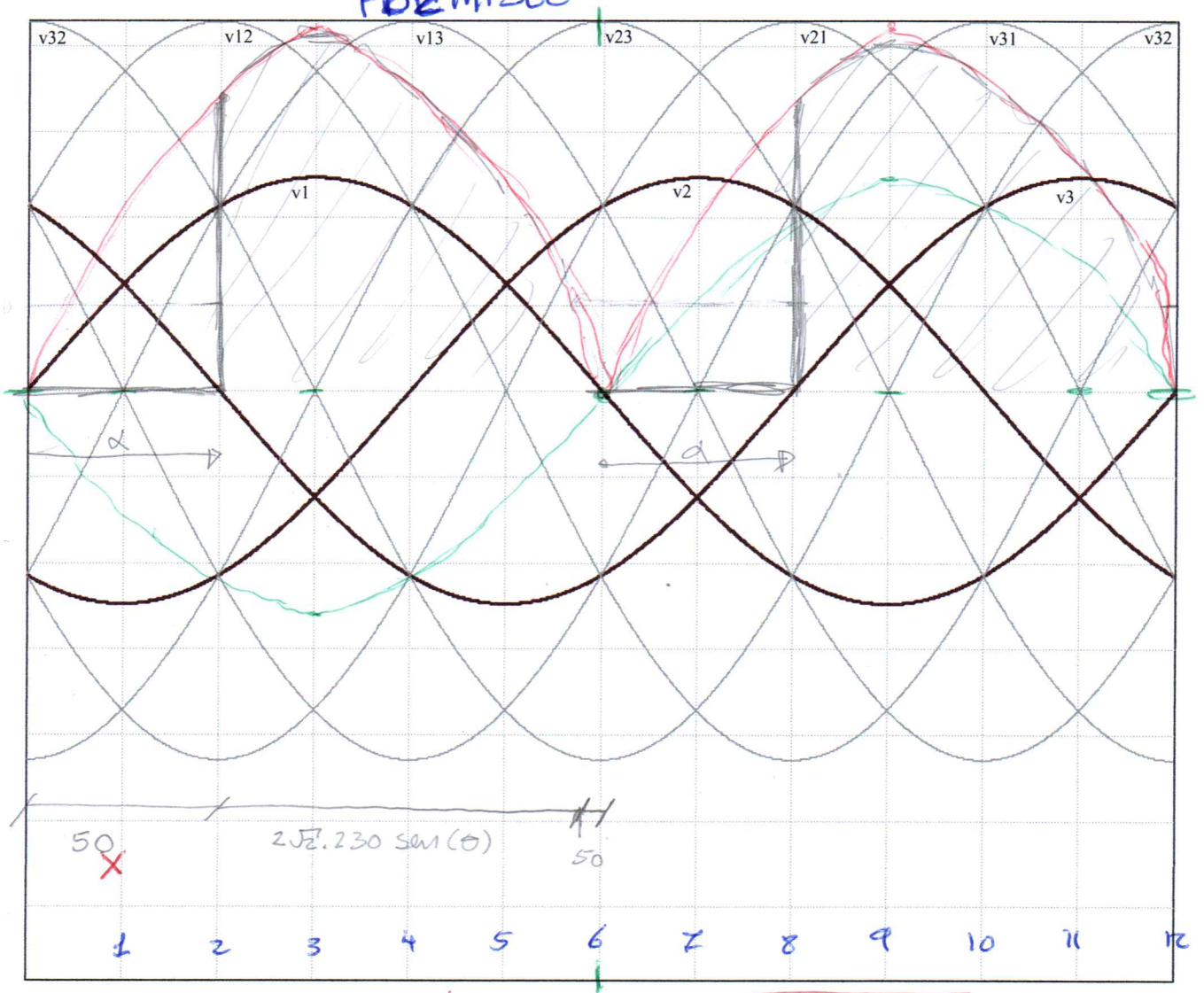
PDE Misto



R = 10 E = 50 comente constante nas cargas

$\alpha = \frac{\pi}{3}$

$V_{omax} = 2 \times \sqrt{2} . 230 = 650,53$ ✓

~~α E_{cross} = 0,7693 rad~~

~~π = 0,7693 rad~~

$V'_{o\,méd} = \frac{1}{\pi} \int_{0}^{\frac{\pi}{3}} 50 + \frac{1}{\pi} \int_{\frac{\pi}{3}}^{\pi - 0,7693} 2.\sqrt{2}\,230 \operatorname{sen}(\theta)\, +$

$\frac{1}{\pi} (50) \Big|_{\pi - 0,7693}^{\pi} = 327,887$

$= 310,609$ [V] ✓

$I_o = \frac{V_{o\,médio} - E}{R = 10}$ (310,609 − 50)

$= 26,0609$ [A]

ou

$V'_{o\,médio} = 2_o \frac{q}{\pi} \sqrt{2}\, V_{rms} \operatorname{sin}\left(\frac{\pi}{q}\right) \times \left(\frac{1 + \cos\alpha}{2}\right)$; $q = 2$

ACCCVZES

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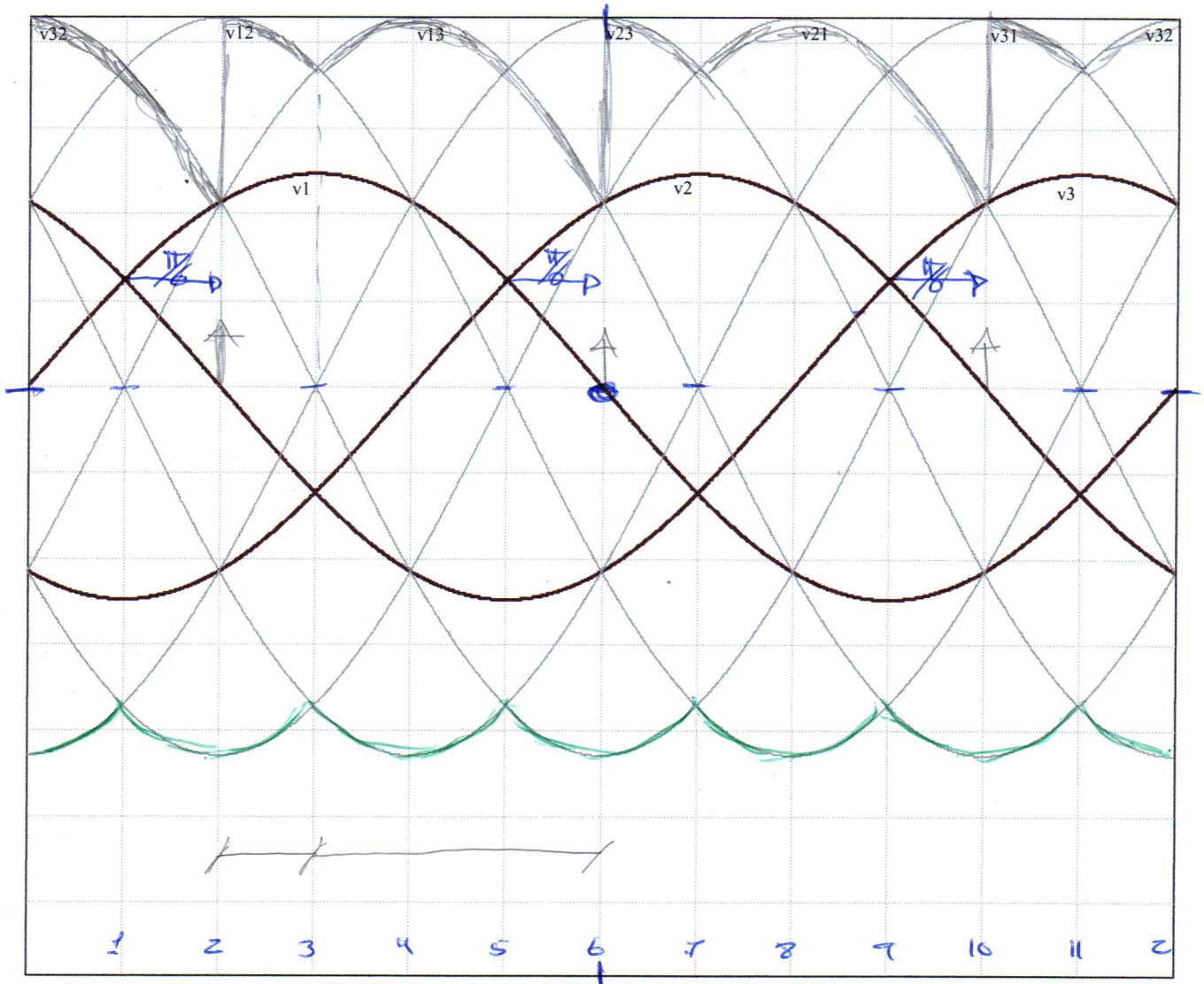

R = 10Ω converte corrente AC para DC $\alpha = \frac{\pi}{6}$

$$V'_{o\,médio} = 3\times\left[\frac{1}{2\pi}\int_{\frac{\pi}{3}}^{\frac{\pi}{2}}\sqrt{2}\cdot\sqrt{3}\cdot 230\cdot\sin\left(\theta+\frac{\pi}{6}\right)+\frac{1}{2\pi}\int_{\frac{\pi}{2}}^{\pi}\sqrt{2}\cdot\sqrt{3}\cdot 230\cdot\sin\left(\theta-\frac{\pi}{6}\right)\right]$$

$$= 501{,}952\ [V_o\,t]$$

ou

$$V'_{o\,médio} = 2\times\frac{q}{\pi}\sqrt{2}\,V_{rms}\sin\left(\frac{\pi}{q}\right)\times\left(\frac{1+\cos(\alpha)}{2}\right)$$

$$I_o = \frac{V'_{o\,medio}-E}{R} = \frac{V'_{o\,médio}}{10} = \frac{501{,}952}{10} = 50{,}19\,[A]$$

$$I'_{méd} = \frac{I_o}{q}\ ;\ I'_{D\text{-}rms} = \frac{I_o}{\sqrt{q}}$$

$I'_{S\text{-}rms}$ / caso 1: $\alpha \le \pi - \frac{2\pi}{q}$ $I'_{S\text{-}rms} = \sqrt{2}\,\frac{I_o}{\sqrt{q}}$

\ caso 2: $\alpha > \pi - \frac{2\pi}{q}$ $I'_{S\text{-}rms} = I_o\sqrt{\frac{\pi-\alpha}{\pi}}$