trabalho 1 prep

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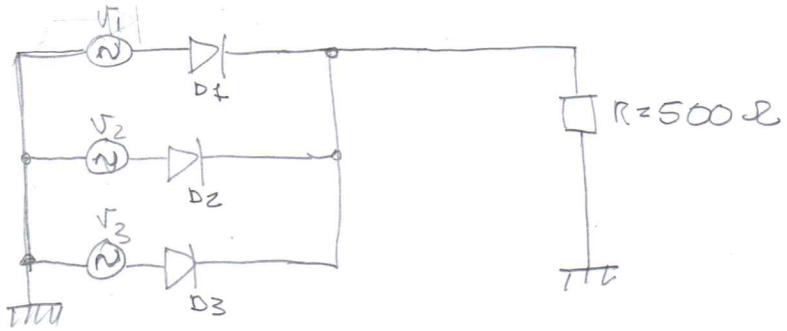
$V_{rms} = 120\ V$ trifasico

1)



$Z = 500 \angle 0°$

2)

$$I_{orms} = \sqrt{\frac{1}{T}\int_0^T (i(\theta))^2 d\theta}$$

Porcamente resistivo

$$\frac{V_{rms}\sqrt{2}}{500} = I_{max} \angle 0$$

$$i(\theta) = \begin{cases} \frac{V_3}{R} & 0 < \theta < \frac{\pi}{6} \\ \frac{V_1}{R} & \frac{\pi}{2} - \frac{\pi}{3} < \theta < \frac{\pi}{2} + \frac{\pi}{3} \\ \frac{V_2}{R} & \frac{\pi}{2} + \frac{\pi}{3} < \theta < \pi + \frac{\pi}{2} \\ \frac{V_3}{R} & \pi + \frac{\pi}{2} < \theta < 2\pi \end{cases}$$

$$I_{orms} = \sqrt{\frac{1}{2\pi}} \times \sqrt{\int_0^{\frac{\pi}{6}} \left(\frac{V_3}{R}\right)^2 + \int_{\frac{\pi}{2}-\frac{\pi}{3}}^{\frac{\pi}{2}+\frac{\pi}{3}} \left(\frac{V_1}{R}\right)^2 + \int_{\frac{\pi}{2}+\frac{\pi}{3}}^{\pi+\frac{\pi}{2}} \left(\frac{V_2}{R}\right)^2 + \int_{\pi+\frac{\pi}{2}}^{2\pi} \left(\frac{V_3}{R}\right)^2}$$

como as fases são simetricas e iguais

$$I_{orms} = 3 \times \sqrt{\frac{1}{2\pi}} \sqrt{\int_{\frac{\pi}{2}-\frac{\pi}{3}}^{\frac{\pi}{2}+\frac{\pi}{3}} \left(\frac{V_1}{R}\right)^2}$$

$$= 0{,}4942188\ A$$

$$I_{oav} = 3 \times \frac{1}{2\pi} \int_{\frac{\pi}{2}-\frac{\pi}{3}}^{\frac{\pi}{2}+\frac{\pi}{3}} \frac{V_1}{R}$$

$$= 0{,}28069\ A$$

$V_1 = \sqrt{2}\, V_{rms} \sin(\theta)$

$\theta = \omega t$

$V_2 = \sqrt{2}\, V_{rms} \sin\left(\theta - \frac{2\pi}{3}\right)$

$V_3 = \sqrt{2}\, V_{rms} \sin\left(\theta - \frac{4\pi}{3}\right)$

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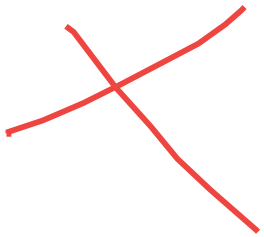
3)

$$V_{D1\,méd} = \frac{1}{\pi}\int_0^{\pi} V_{D1}(\theta)\,d\theta$$

$$V_{D_1} = V_A - V_K = V_1 - V_0$$

$$V_{D1}(\theta) \begin{cases} V_1 - V_3 & , \ 0 < \theta < \frac{\pi}{2} - \frac{\pi}{3} \\ 0 & , \ \frac{\pi}{2} - \frac{\pi}{3} < \theta < \frac{\pi}{2} + \frac{\pi}{3} \\ V_1 - V_2 & , \ \frac{\pi}{2} + \frac{\pi}{3} < \theta < \pi + \frac{\pi}{2} \\ V_1 - V_3 & , \ \pi + \frac{\pi}{2} < \theta < 2\pi \end{cases}$$



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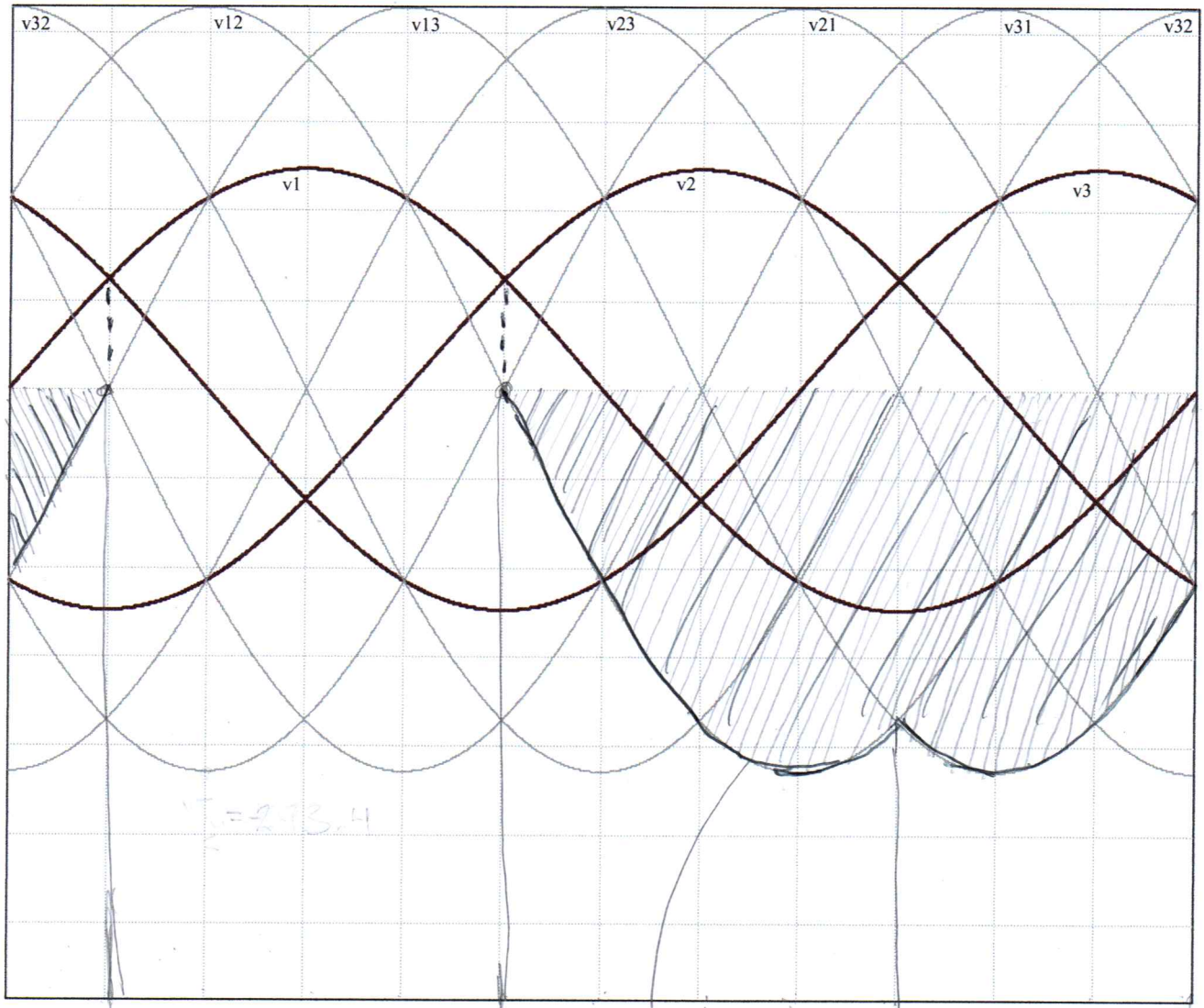
3)



$$V_{D1av} = \frac{1}{\pi}\left(+\int_{-\frac{\pi}{6}}^{0} \sqrt{2}\sqrt{3}\,V_{ef}\,\mathrm{sen}(\theta)\,d\theta - \int_{0}^{\frac{4\pi}{6}} \sqrt{2}\sqrt{3}\,V_{ef}\,\mathrm{sen}(\theta)\,d\theta - \int_{\frac{2\pi}{6}}^{\frac{5\pi}{6}} \sqrt{2}\sqrt{3}\,V_{ef}\,\mathrm{sen}(\theta)\,d\theta\right)$$

$$= -140,81 \text{ Volt}$$

$$V_{composto\ med} = \sqrt{2}\sqrt{3}\,120 = 293,93\ V$$