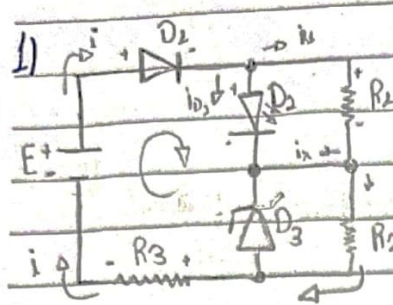


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$$V_{D1} = 0,7V \quad V_{D2} = 2V \quad V_{D3} = 1V \quad V_Z = 5V$$

$$R_1 = R_2 = R_3 = 1k\Omega$$

$$-E + V_{D1} + V_{D2} + V_Z + V_{R3} = 0$$

$$E = V_{D1} + V_{D2} + V_Z + V_{R3}$$

$$E = 0,7 + 2 + 5 + 3$$

$$E = 10,7V$$

$$V_{R2} = R_2 \cdot i_2$$

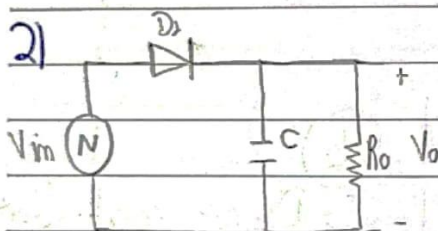
$$i_{R2} = \frac{2V}{1000} = 2mA$$

$$i = i_3 = i_2 = 3mA$$

$$V_{R2} = V_Z = 5V$$

$$i_2 = \frac{5}{1000} = 5mA$$

$$V_{R3} = R_3 \cdot i = 1000 \cdot 3mA = 3V$$



$$V_{RMS} = 12V \quad f = 60Hz \quad R_0 = 100\Omega \quad C = 330\mu F$$

Diode ideal

$$V_{PICO} = 12\sqrt{2}$$

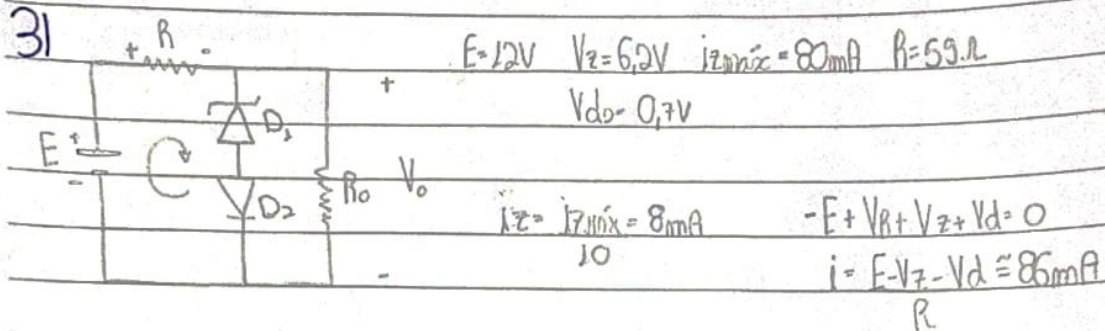
$$V_{PICO} = V_{médio} \cdot \frac{\pi}{2}$$

$$V_{apls} = V_{PICO} = 12\sqrt{2} = 8,57V$$

$$f = E \cdot R = 60 \cdot 330 \mu \cdot 100$$

$$V_{médio} = \frac{V_{PICO} \cdot 2}{\pi} = \frac{24\sqrt{2}}{\pi} = 10,80V$$

Daniel Augusto Müller



Máximo:

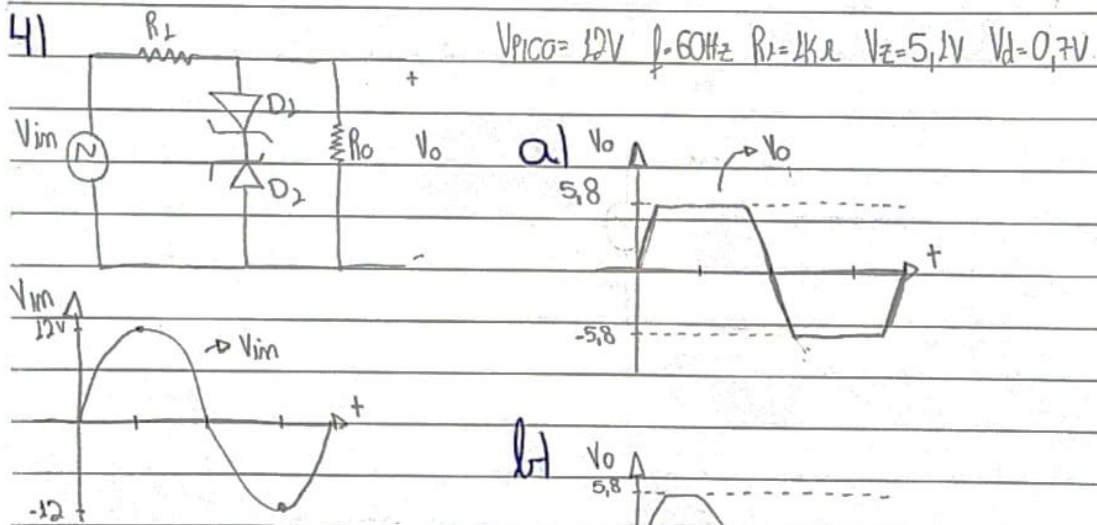
$$I_{o_{max}} = i - i_z = 86 - 8 = 78mA$$

Mínimo:

$$I_{o_{min}} = i - i_z = 86 - 8 = 78mA$$

$$R = \frac{V_o}{i} = \frac{6.2 + 0.7}{78mA} = 88\Omega$$

$$R = \frac{V_o}{i} = \frac{6.9V}{78mA} = 88\Omega$$



Os limites inferior e superior não mudam ( $\pm 5.8V$ ), mas com o  $R_0$ , o gráfico fica "mais arredado" que o primeiro;