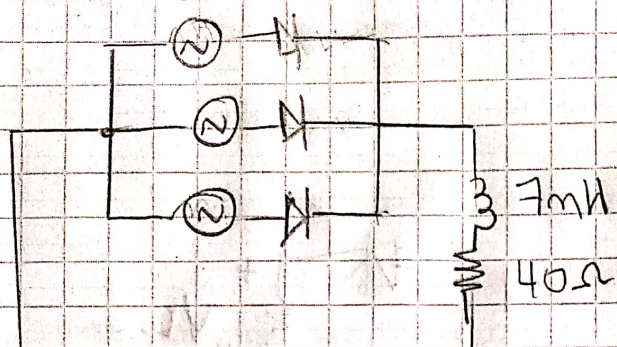


① Brian Sebastián Cárceles Píntun 1803245.



$$\frac{2}{3} \pi$$

$$180^\circ \times \frac{\pi}{180}$$

$$30^\circ$$

ángulo desde cruce por $\cos = 90^\circ$

$$V_L = 270 \text{ Vp } 60 \text{ Hz}$$

$$\alpha = \underbrace{90^\circ}_{\text{Cruce por } 0} - \underbrace{30^\circ}_{\text{Cruce de las fases}} = 60^\circ$$

$$V_{F_{\max}} = \frac{V_{L_{\max}}}{\sqrt{3}} = \frac{270}{\sqrt{3}} = 155,88 \text{ [V]}$$

$$V_{\text{rms}} = \sqrt{3} V_{F_{\max}} \left[\frac{1}{6} + \frac{\sqrt{3}}{8\pi} \cos(2\alpha) \right]^{\frac{1}{2}}$$

$$V_{\text{rms}} = \sqrt{3} (155,88) \left[\frac{1}{6} + \frac{\sqrt{3}}{8\pi} \cos(2(60^\circ)) \right]^{\frac{1}{2}}$$

$$V_{\text{rms}} = 198,17 \text{ [V]}$$

$$P = \frac{V_{\text{rms}}^2}{R} = \frac{(198,17)^2}{40} = 240,93 \text{ W}$$

② $110 \text{ V}_{\text{rms}} \quad 50 \text{ Hz.}$

$$V_{\text{OAS}_{\text{out}}} = 75\% V_{\text{max}}$$

$$V_{\text{max}} = 110 \sqrt{2} = 155,56 \text{ [V]}$$

$$V_{\text{OAS}_{\text{out}}} = 155,56 \times 0,75 = 116,67 \text{ [V]}$$

$$V_{\text{OC}} = \frac{3V_m}{\pi} \cos \alpha$$

$$\alpha = \cos^{-1} \left(\frac{V_{\text{OC}} \pi}{3 V_m} \right) = \cos^{-1} \left(\frac{(116,67)(\pi)}{3 (110 \sqrt{2})} \right)$$

$$\alpha = 38,24$$

$$\frac{1}{50} \rightarrow 360^\circ$$

$$\text{time} \rightarrow 38,24^\circ \rightarrow \text{time} = 2,12 \text{ ms}$$

$$R = 50 \Omega$$

③ $\alpha = ?$

$$525 \text{ [W]}$$

$$377 = 2\pi f \rightarrow f = 60 \text{ Hz.}$$

$$270 = V_m \rightarrow V_{\text{rms}} = 270 / \sqrt{2} = 190,91$$

$$P = \frac{V_{\text{rms}}^2}{R} \rightarrow V_{\text{rms}} = \sqrt{PR} = \sqrt{525 \times 50}$$

$$V_{\text{rms}} = 162,02 \text{ [V]}$$

$$V_{\text{rms}} = V_{\text{rms}} \sqrt{\frac{1}{\pi} \left(\pi - \alpha + \frac{\sin 2\alpha}{2} \right)} \rightarrow \left(\frac{V_{\text{rms}}}{V_{\text{rms}}} \right)^2 = 1 - \frac{\alpha}{\pi} + \frac{\sin 2\alpha}{2\pi}$$

Approximando $\rightarrow \alpha$ per Taylor

$$\alpha = 54^\circ$$