



$$R = 1\Omega \quad I_0 = 9 \Rightarrow V_0 = 9\text{V}, V_{rms} = 22.5\text{V}$$

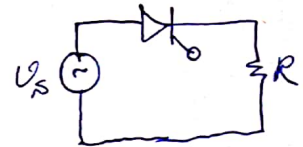
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$$\text{الف) } \alpha = \cos^{-1} \left[9 \cdot \left(\frac{2\pi}{22.5} \right) - 1 \right] = 0.91374 \text{ rad} = 52.14^\circ$$

(1)

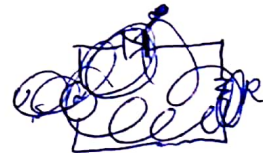
$$P_R = \frac{V_{rms}^2}{R} = \frac{(151.91)^2}{1\Omega} = 23091.792$$

(ب)



$$V_{rms} = \frac{22.5}{\sqrt{2}} \sqrt{1 - \frac{0.9137}{\pi} + \frac{\sin(2 \times 0.9137)}{2\pi}} = 151.91$$

$$I_{rms} = \frac{151.91}{1\Omega} = 151.91$$



$$S = V_{s,rms} \times I_{rms} = 220 \times 151.91 = 33422.24$$

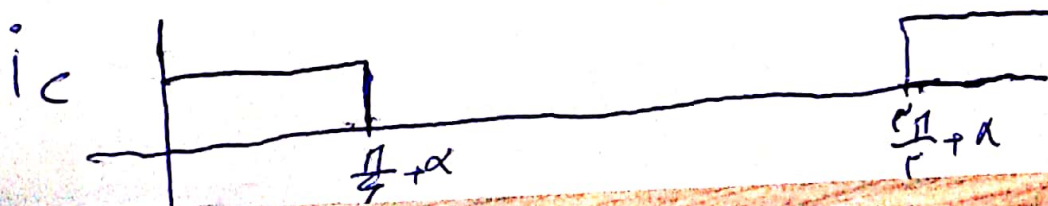
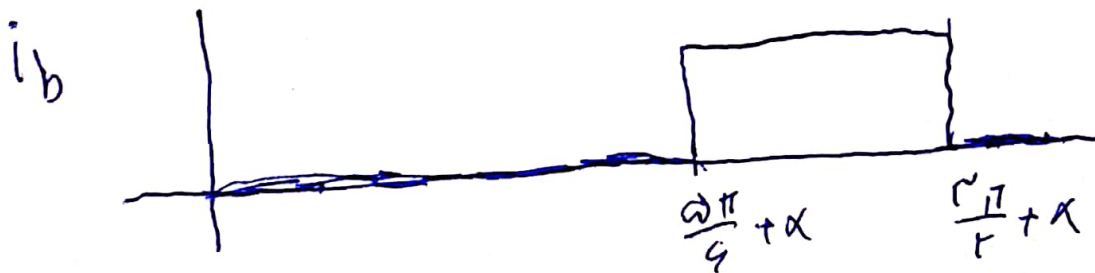
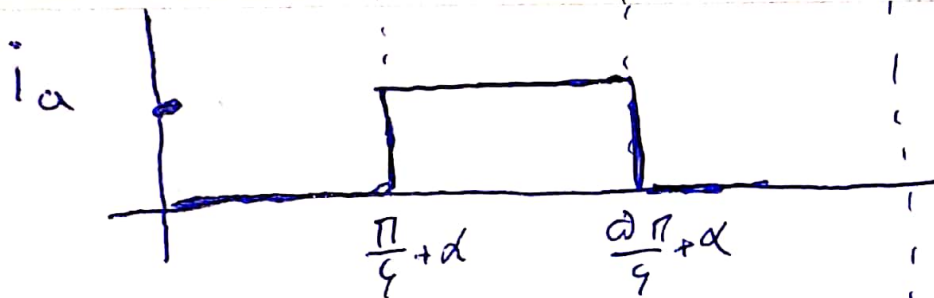
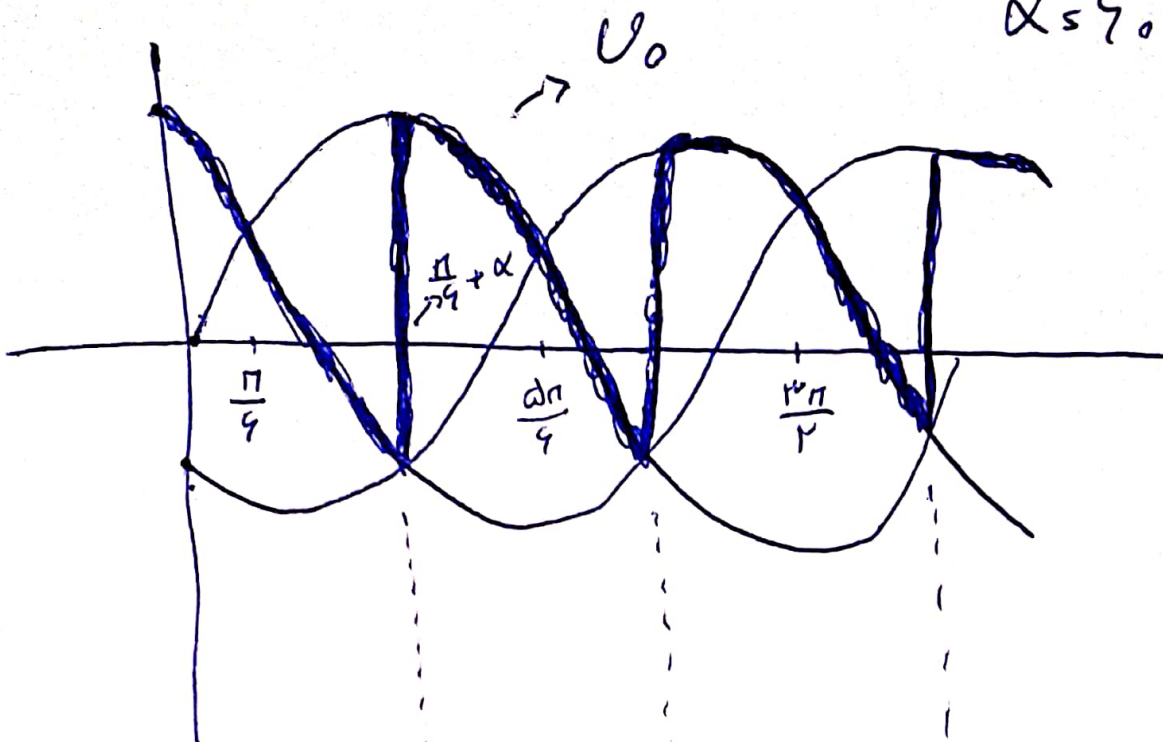
(2)


$$P.f = \frac{P}{S} = \frac{23091.792}{33422.24} = 0.6908 \Rightarrow 69\%$$

$$\alpha \leq 90^\circ \leq 1.57 \text{ rad}$$

(٢)

(الف)





$$U_{odc} = \frac{1}{\frac{\pi}{\omega}} \int_{\frac{\pi}{\omega} + \alpha}^{\frac{2\pi}{\omega} + \alpha} U_m \sin \omega t d\omega t = \frac{\omega \sqrt{\omega} \times 14.14 \sqrt{2}}{\pi \times \sqrt{\omega}} \cos(110^\circ FV) = 141.41$$

$$U_m = \frac{14.14}{\sqrt{2}} \times \sqrt{2}$$

$$I_{rms} = I_o = I_d$$

$$P.f = \frac{U_{odc} \times I_d}{\sqrt{\omega} \times U_{Lrms} \times I_d} = \frac{141.41 \times I_o}{\sqrt{\omega} \times 14.14 \times I_o} = 0.1921 \rightarrow 19.21\%$$