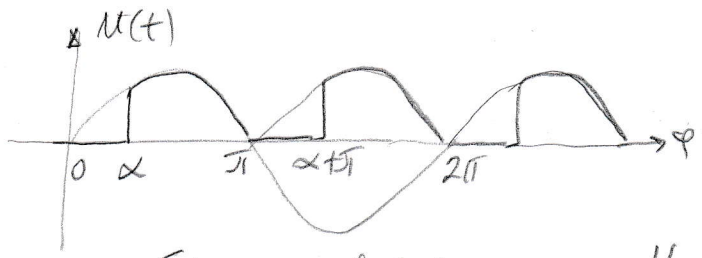
TE - 20200205

1.



$$u_M(t)=\begin{cases}0 & 0<\varphi<\alpha\\ U_m\sin\varphi, & \alpha<\varphi<\pi\end{cases}$$

$$U_M=\frac{1}{\pi}\int_{\alpha}^{\pi}U_m\sin\varphi\,d\varphi$$

$$U_M=\frac{230\sqrt{2}}{\pi}(-\cos\varphi)\Big|_{\alpha}^{\pi}=\frac{230\sqrt{2}}{\pi}(1+\cos\alpha)$$

$U_{M1}=50V \Rightarrow 50\pi=(1+\cos\alpha)\,230\sqrt{2}$

$$\cos\alpha_1=\frac{50\pi}{230\sqrt{2}}-1 \Rightarrow \alpha_1=\arccos\left(\frac{50\pi}{230\sqrt{2}}-1\right)=121°$$

$U_{M2}=150V \Rightarrow \cos\alpha_2=\frac{150\pi}{230\sqrt{2}}-1 \Rightarrow \alpha_2=\arccos\left(\frac{150\pi}{230\sqrt{2}}-1\right)=63°$

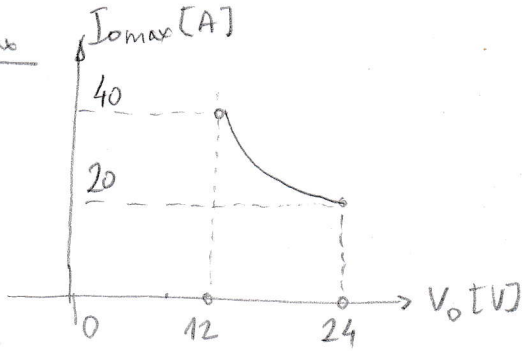
2

$P_{Imax}=48V\cdot 10A=480W$

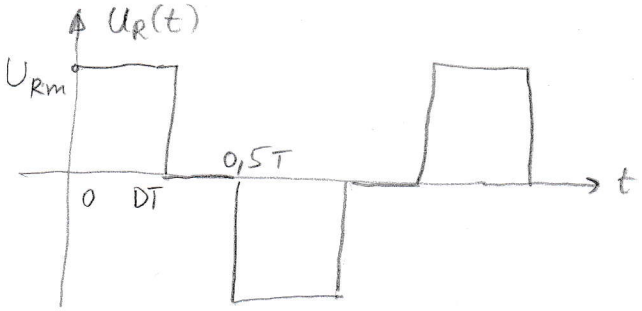
$P_{omax}=P_{Imax}=V_o\cdot I_{omax} \Rightarrow I_{omax}=\frac{P_{omax}}{V_o}$

$$I_{omax1}=\frac{P_{omax}}{V_{o1}}=\frac{480W}{12V}=40A$$

$$I_{omax2}=\frac{P_{omax}}{V_{o2}}=\frac{480W}{24V}=20A$$



3



$U_{Rm}=24\cdot 12=288V$

$$P_R=\frac{1}{R}\frac{1}{T}\int_0^T u_R^2(t)=\frac{1}{R}\frac{2}{T}\int_0^{DT}288^2\,dt=\frac{2\cdot 288^2}{RT}\cdot DT$$

$$P_R=D\cdot\frac{2\cdot 288^2}{100} \Rightarrow D=\frac{P_R}{\frac{2\cdot 288^2}{100}}=\frac{400\cdot 100}{2\cdot 288^2}=0{,}241$$
