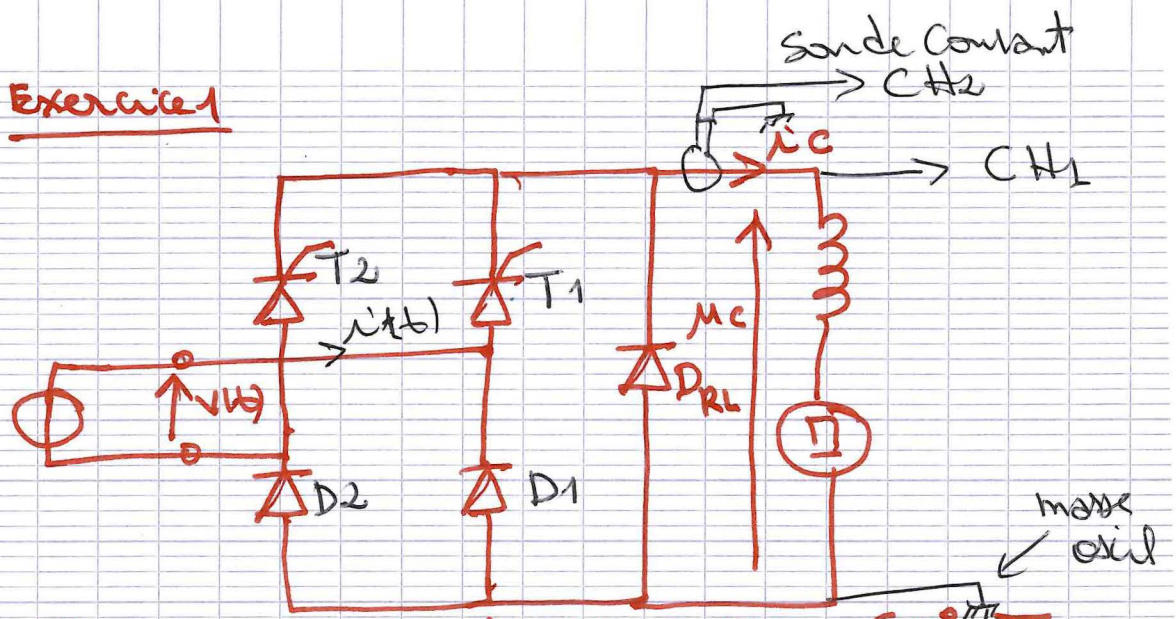
Exercice 1

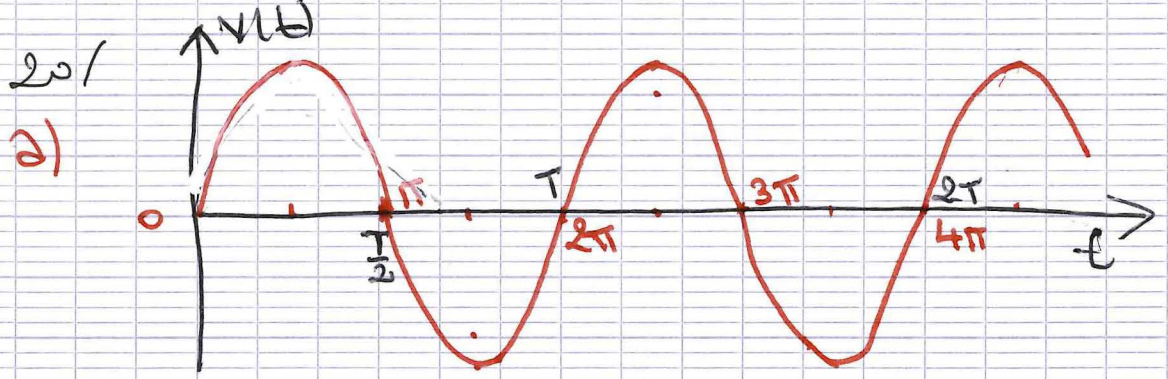


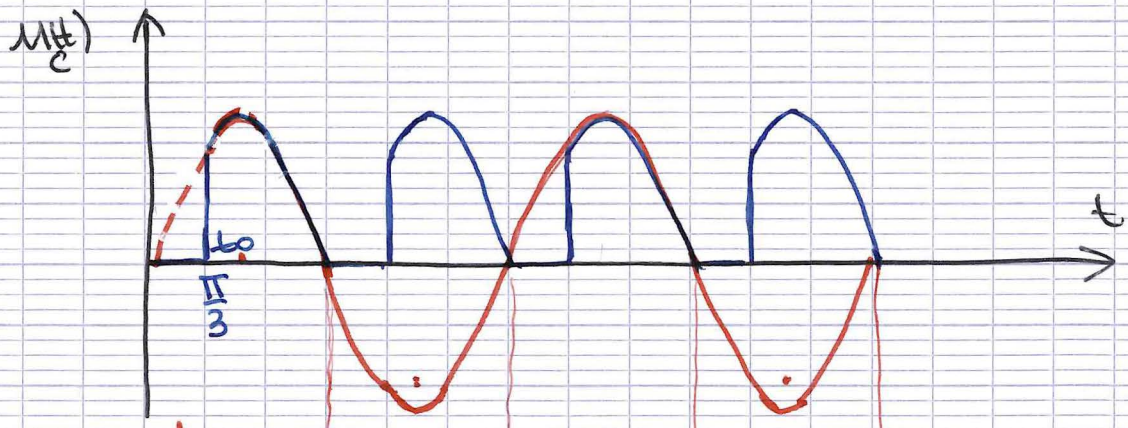
$I_c = 12\,A$; $V = 240\,V$ $\quad \theta_0 = 60° = \frac{\pi}{3}$

$R = 1\,\Omega$ $\quad E = k.n$ avec $k = 0{,}1\,V/tr/min$

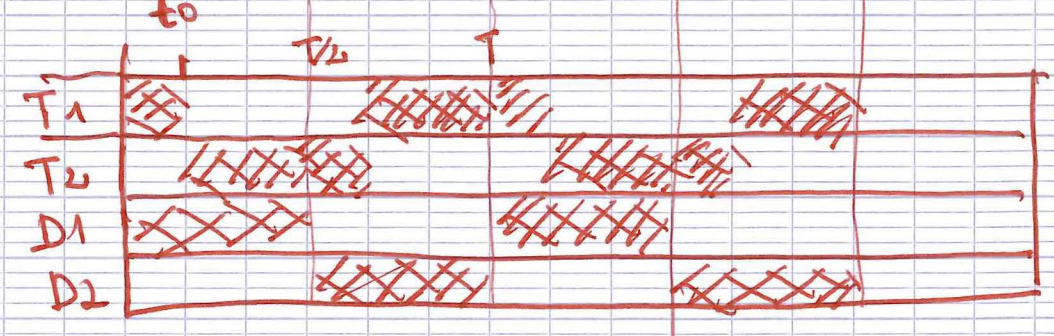
2/

a)





b)



c)

$$\langle u_c \rangle = \frac{V_{max}}{\pi}(1+\cos\theta_0)$$

$$V_{max} = V\sqrt{2} = 240\times\sqrt{2} = 339{,}4\,V$$

$$\langle u_c \rangle = \frac{339{,}4\,(1+\cos(\pi/3))}{\pi} = 162{,}14\,V$$

d) $u_{(t)} = \underbrace{u_R}_{0} + u_L + u_M$

$$\Rightarrow \langle u_c \rangle = \underbrace{\langle u_L \rangle}_{0} + \langle u_M \rangle = \langle u_M \rangle$$

$$\Rightarrow \langle u_M \rangle = \langle u_c \rangle = 162{,}14\,V$$

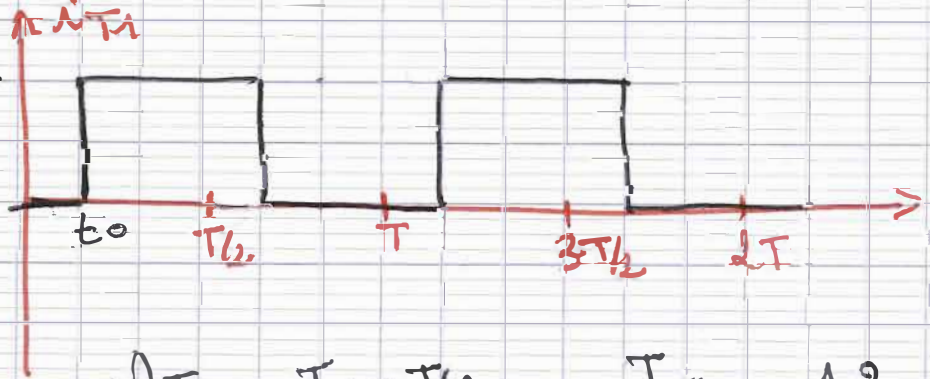
$$\langle u_M \rangle = E + RI \Rightarrow E = \langle u_c \rangle - RI$$

$$E = 162{,}14 - 1\times 12 \simeq 150\,V$$

comme $E = 0{,}1\times n \Rightarrow n = \frac{E}{0{,}1} = \frac{150}{0{,}1}$

$$\boxed{n = 1500\ tr/min}$$

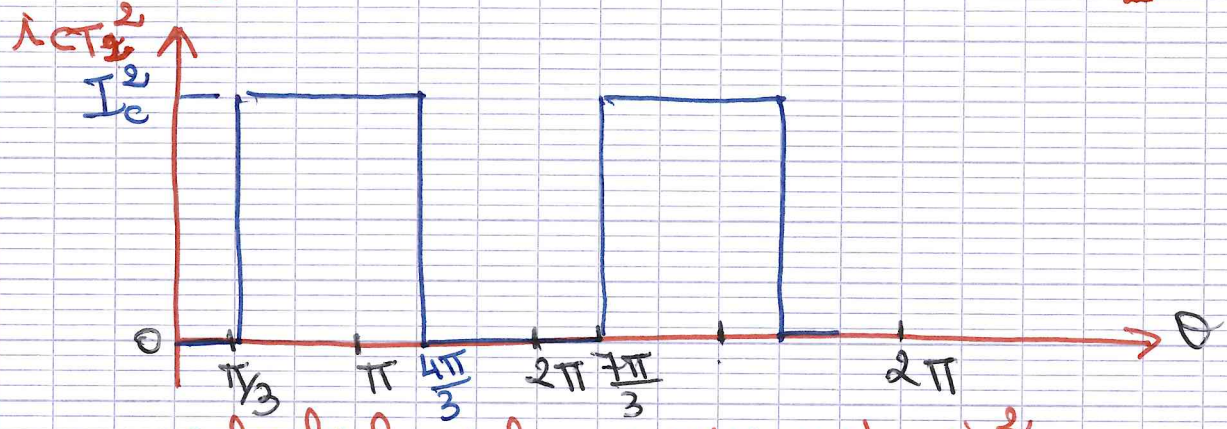
e)



$$\langle i_T \rangle = \frac{\Delta Q_T}{T} = \frac{I_c \times T/2}{T} = \frac{I_c}{2} = \frac{12}{2} = 6\,A$$

valeur efficace :

$I_{T2} = \sqrt{< i_{CT2}^2 >}$ on dessine i_{CT2}^2



on calcule la valeur moyenne de i_{CT1}^2

$$< i_{CT2}^2 > = \frac{A_T}{T} = \frac{I_c^2 \times \pi}{2\pi} = \frac{I_c^2}{2}$$

finalement $I_{CT1} = \sqrt{< i_{CT2}^2 >} = \sqrt{\frac{I_c^2}{2}}$

$$I_{CT2} = \frac{I_c}{\sqrt{2}} = \frac{12}{\sqrt{2}} = 8{,}48\ A$$