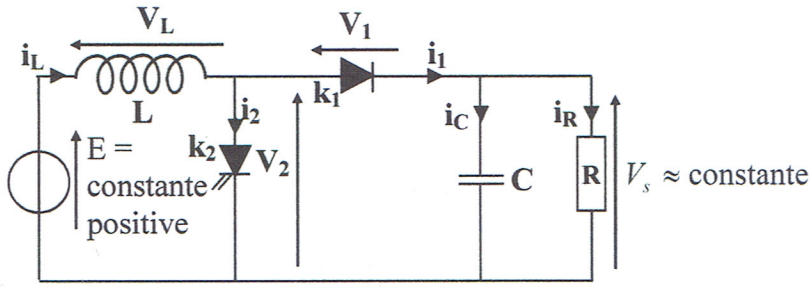
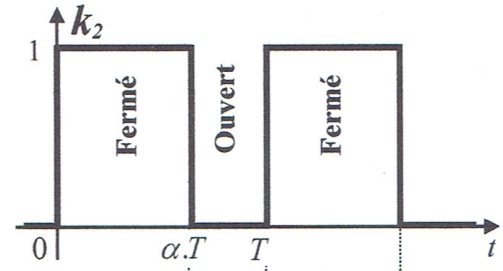
République Algérienne Démocratique Et populaire
Université de Med Boudiaf M'sila
Département de génie électrique
3eme année licence académique en électrotechnique et électromécanique
Module : Electronique de puissance

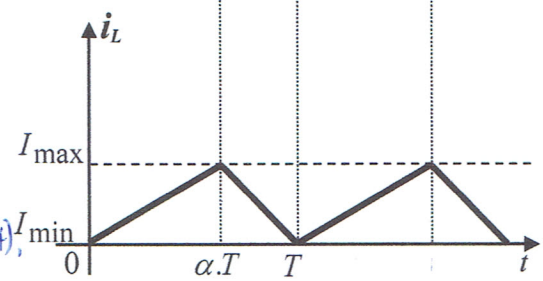
Corrigé type examen S05

28/01/2020
Durée : 1H30mn

Exercice N°01(08pts)







(0,5) a) Dans ce montage, on a un regime à la limite de conduction.

(1,5) b) Les allures des signaux de $i_1(t)$, $i_2(t)$ et $V_2(t)$:

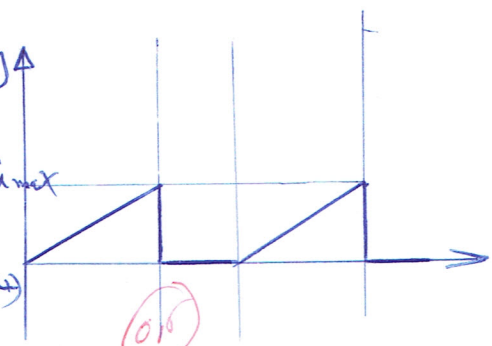
(1) c) - Pour $t \in [0, \alpha T]$: $i(t) = \frac{E}{L} t$ --- (1)

à $t = \alpha T$: $i(\alpha T) = i_{max} = \frac{E}{L} \alpha T$ --- (2)

Pour $t \in [\alpha T, T]$:

$$i(t) = \frac{E - V_s}{L} (t - \alpha T) + i_{max} \text{ --- (3)}$$

$$a\ t = T \ ; \ i(T) = \frac{E - V_s}{L} (T - \alpha T) + i_{max} = 0 \text{ --- (4)}$$

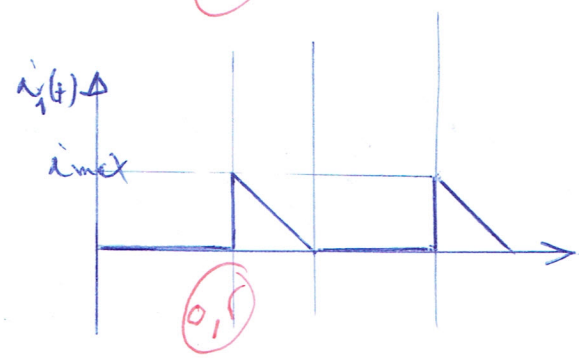


(0,5)

En substituant (2) dans (4), on aura :

$$\frac{E - V_s}{L} T(1 - \alpha) + \frac{E}{L} \alpha T = 0$$

$$\Rightarrow \boxed{V_s = \frac{E}{1 - \alpha}}$$

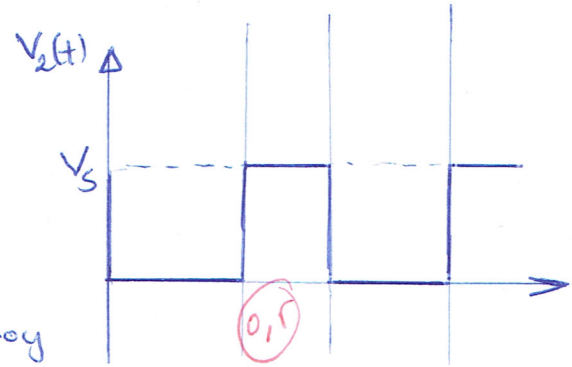


(0,5)

(0,5) d) $\boxed{i_{L\,moy} = \frac{i_{max}}{2}}$

(0,5) e) $i_{1\,moy} = \frac{i_{L\,moy} (T - \alpha T)}{T}$

$$\Rightarrow \boxed{i_{1\,moy} = i_{L\,moy} (1 - \alpha)}$$



(0,5)

(0,5) f) - $i_{2\,moy} = \frac{i_{L\,moy} \cdot \alpha T}{T} = \alpha\, i_{L\,moy}$

$$\Rightarrow \boxed{i_{2\,moy} = \alpha \cdot i_{L\,moy}}$$

g) - $i_i(t) = i_C(t) + i_R(t) \Rightarrow i_{R\,moy} = i_{1\,moy} - i_{C\,moy}$

(1) $\Rightarrow i_{R\,moy} = i_{1\,moy} = i_{L\,moy}(1-\alpha) = \frac{i_{max}}{2}(1-\alpha)$

$\Rightarrow \boxed{i_{R\,moy} = (1-\alpha)\cdot\frac{i_{max}}{2}}$

(1) h) - $P_s = V_s \cdot i_R \Rightarrow \boxed{P_{s\,moy} = \frac{E}{1-\alpha}\cdot\frac{i_{max}}{2}(1-\alpha) = E\cdot\frac{i_{max}}{2}}$

(0,5) i) Par conservation de la puissance active : $P_{fournie} = P_{reçue}$

$\Rightarrow (P_{fournie})_{moy} = (P_{reçue})_{moy}$

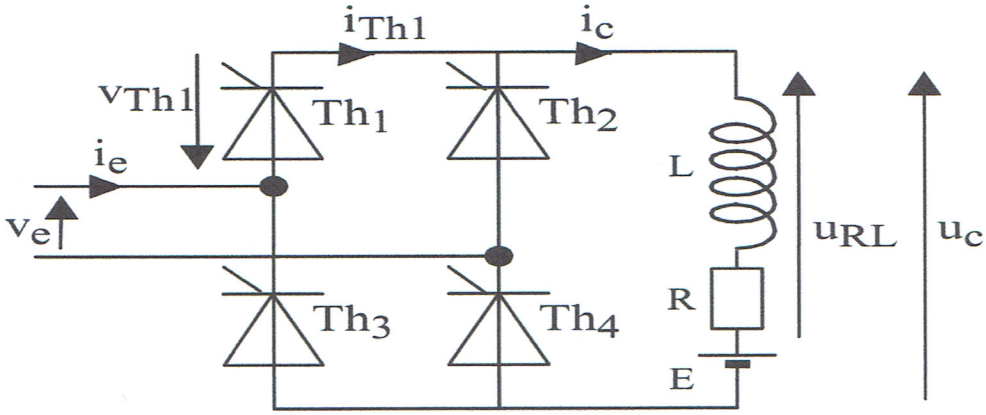
$\Rightarrow P_{fournie} = P_{L\,moy} + P_{C\,moy} + P_{R\,moy} = P_{R\,moy}$

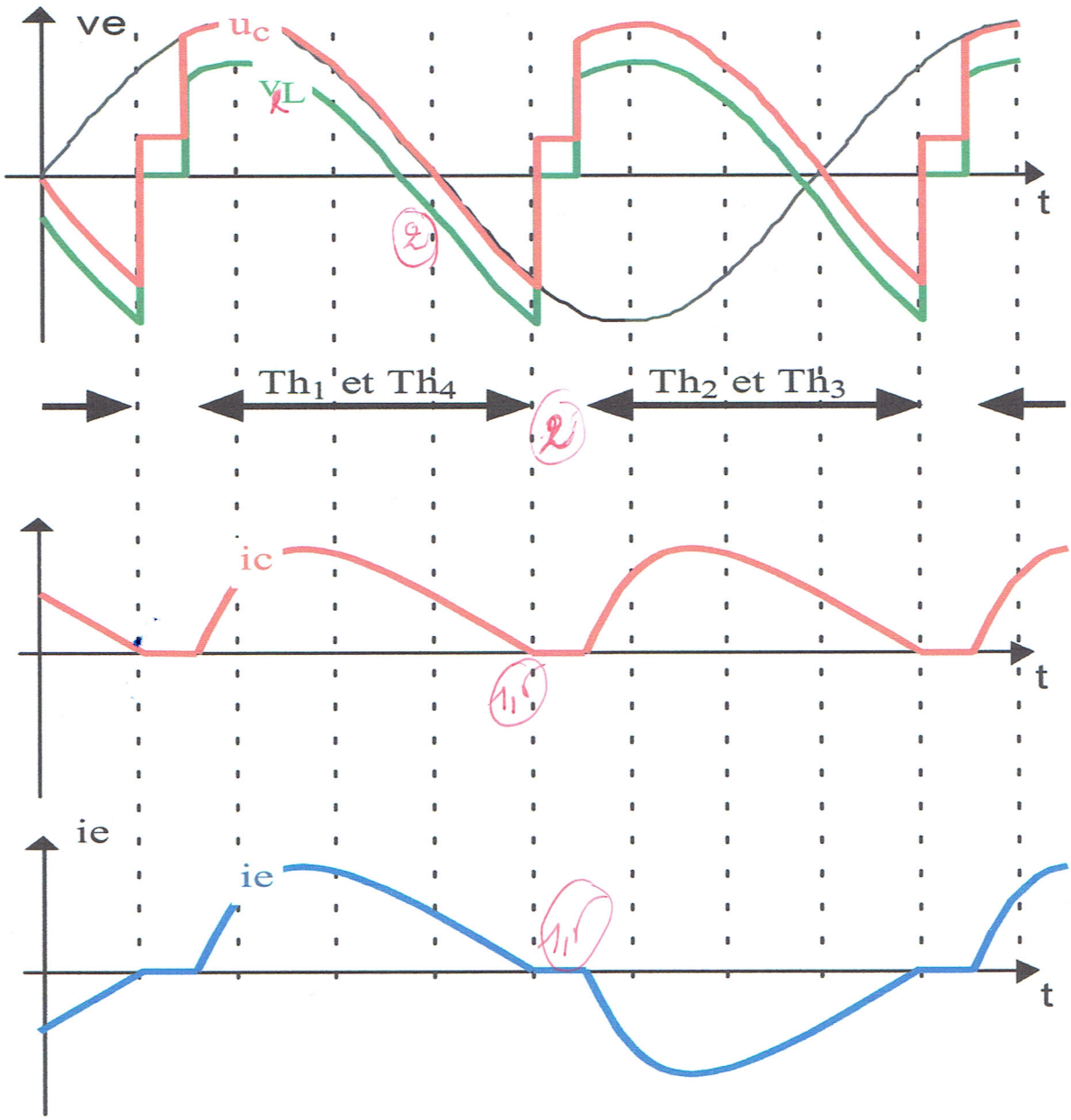
$\Rightarrow \boxed{P_e = P_s = P_R}$

(1) j) $P_s = P_e \Rightarrow E\cdot i_{L\,moy} = V_s \cdot i_{1\,moy} = V_s \cdot i_{L\,moy}(1-\alpha)$

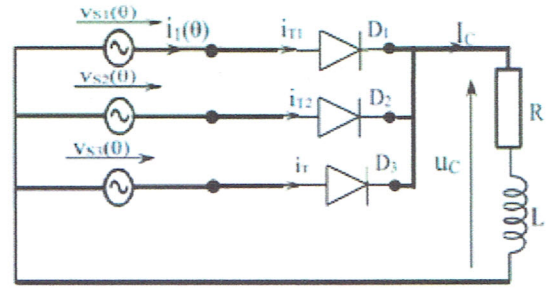
$\Rightarrow \boxed{V_s = \frac{E}{1-\alpha}}$

Exercice N ° 02 (7 pts)





Exercice N°03(05 pts)

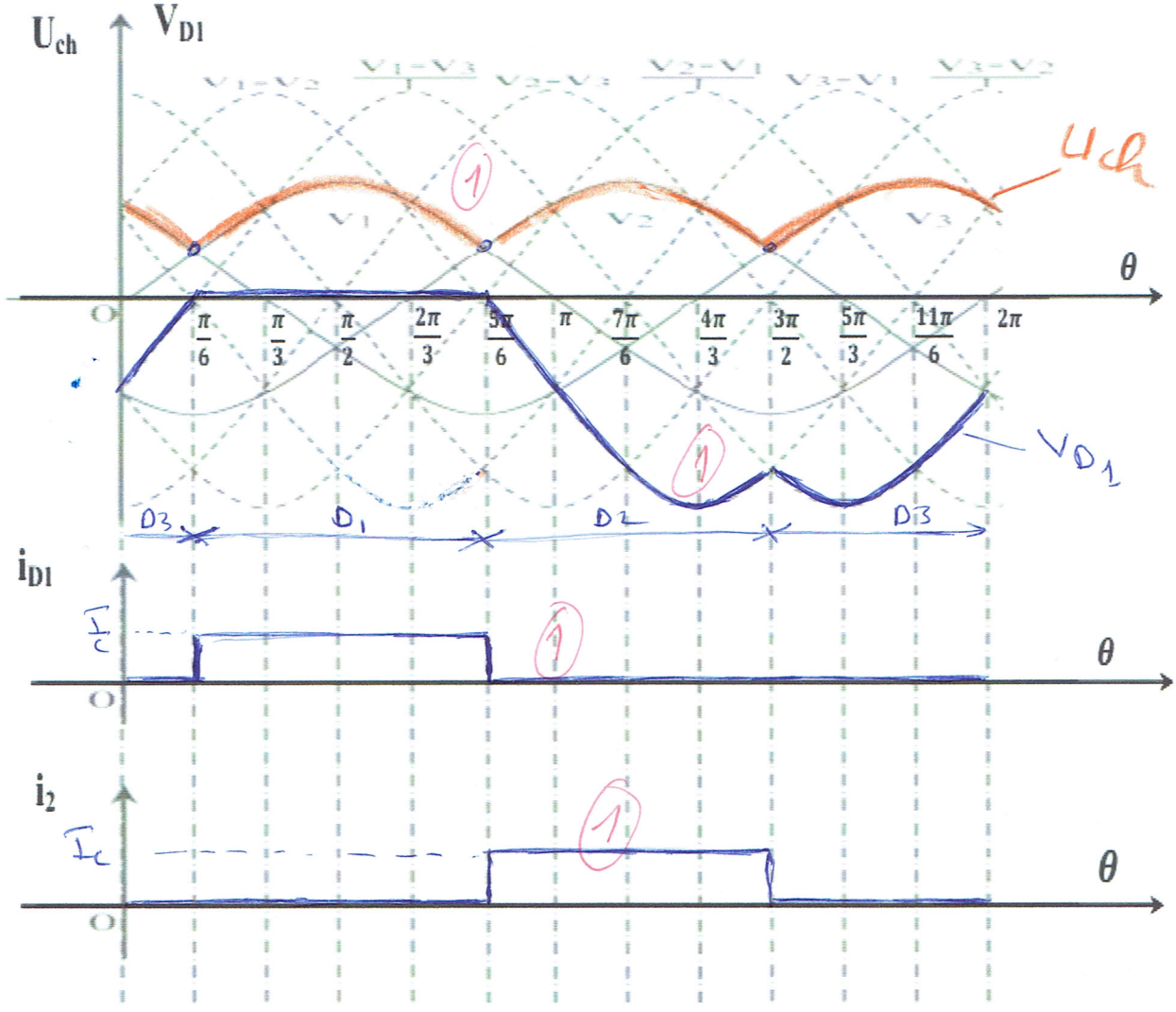


1- tableau d'analyse de fonctionnement du document réponse.

Intervalles	**Diode en conduction**	U_{ch}	v_{D1}	i_{D1}	i_2
$[0, \frac{\pi}{6}]$	D 3	V_3	U_{13}	0	0
$[\frac{\pi}{6}, \frac{5.\pi}{6}]$	D 1	V_1	0	I_c	0
$[\frac{5\pi}{6}, \frac{3\pi}{6}]$	D 2	V_2	U_{12}	0	I_c
$[\frac{3\pi}{6}, 2\pi]$	D 3	V_3	U_{13}	0	0

(1)

2- Représentation des graphes : $u_C(\theta)$, $v_{D1}(\theta)$, $i_{D1}(\theta)$ et $i_2(\theta)$.



3) - $U_{ch\,moy} = \frac{3}{2\pi} \int_{\frac{\pi}{6}}^{\frac{5\pi}{6}} V_{max} \cdot \sin\theta \, d\theta$.

$$= \frac{+3V_{max}}{2\pi} \left(-\cos\theta\right)_{\frac{\pi}{6}}^{\frac{5\pi}{6}}$$

$$= \frac{3V_{max}}{2\pi} \left(-\cos\frac{5\pi}{6} + \cos\frac{\pi}{6}\right)$$

$$= \frac{3V.\sqrt{2}}{2\pi} \left(\frac{2\times\sqrt{3}}{2}\right) = \frac{3V.\sqrt{6}}{2\pi} \Rightarrow U_{ch\,moy} = \frac{3V.\sqrt{6}}{2\pi}$$

- Si $U_{ch\,moy} = 256\,V \Rightarrow \frac{3V.\sqrt{6}}{2\pi} = 256$

$$\Rightarrow V = \frac{2\pi \times 256}{3.\sqrt{6}}$$

$$\Rightarrow V = 218{,}88\,V$$