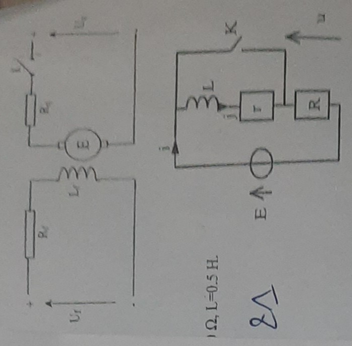


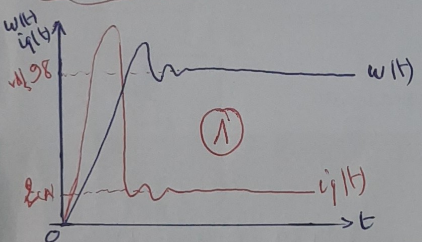
On Applique Méthode Héveaside

(2)

$$H(P) = \frac{f(0)}{F(0)} + \sum \frac{f(P_i)}{P_i F'(P_i)} e^{P_i t} \quad P_1, P_2$$

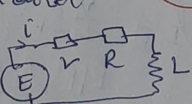
$$\Rightarrow \boxed{i(t) = 2 - 128\, e^{-8{,}873t} + 126\, e^{-1{,}127t}} \quad (1{,}5)$$

$$\boxed{w(t) = 98 + 14\, e^{-8{,}873t} - 112{,}51\, e^{-1{,}127t}} \quad (1{,}5)$$



(1)

EX2 à $t=0$ K ouvert (10 pts)



$$\begin{cases} E = (R+r)\,i(t) + L\dfrac{\partial i(t)}{\partial t} \\ i = i_f + i_e \end{cases} \quad (0{,}5)$$

1°/ $i_f = ?$ $t \to \infty \to$ RP

$$\boxed{i_f = \frac{E}{R+r} = \frac{1}{3}\,(A)} \quad (1{,}5)$$

2°/ $Z(P)$

$$I(P) = \frac{E}{P(R+r+LP)}$$

$$\Rightarrow \boxed{P = \frac{-(R+r)}{L} = -600} \quad (1{,}5)$$

3°/ $i_e(t)$?

$$i_e(t) = A\,e^{Pt}$$

4°/ condition initiale $i(0^-) = i(0^+) = ?$

$$i(t) = \frac{E}{R} \quad (0{,}5)$$

$$i(0) = \frac{E}{R+r} + A e^0 = \frac{E}{R}$$

$$\Rightarrow \boxed{A = \frac{rE}{R(R+r)}} \quad (1{,}5)$$

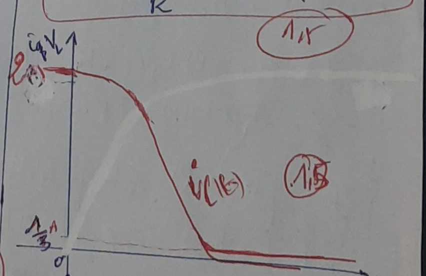
$$\Rightarrow i(t) = \frac{E}{R+r} + \frac{rE}{R(R+r)} e^{-\frac{(R+r)}{L}t} \; (A)$$

$$i(t) = \frac{1}{3} + \frac{5}{3} e^{-600t} \; (A) \quad (1{,}5)$$

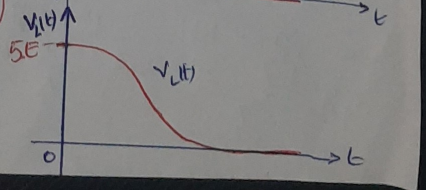
$$V_L(t) = L\,\frac{\partial i(t)}{\partial t} = L\,\frac{\partial}{\partial t}\left(\frac{rE}{(R+r)R} e^{Pt}\right)$$

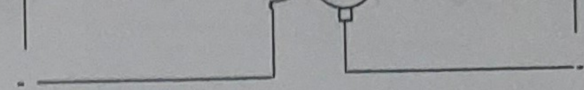
$$V_L(t) = \cancel{L}\,\frac{rE}{R\cancel{(R+r)}} \cdot \frac{\cancel{(R+r)}}{\cancel{L}}\, e^{Pt}$$

$$\boxed{V_L(t) = \frac{rE}{R} e^{Pt} = 5E\, e^{-600t}} \quad (1{,}5)$$



(1,5)





N.m/rad.s, Cr=2 N.m

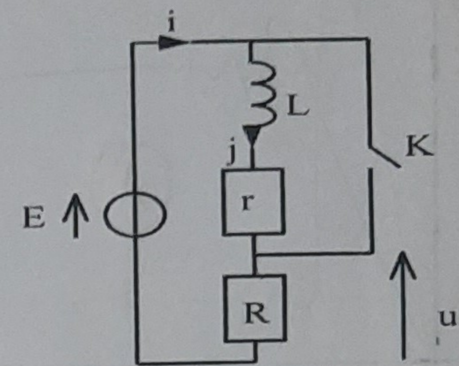
- Quelle est la loi de variation de $i_q(t)$, $\omega(t)$?
- Trace l'allure de $i_q(t)$, $\omega(t)$?

Exercice 01 : (10 pts)

On considère le circuit suivant : E=100 v, R=50 Ω, r=250 Ω, L=0.5 H.

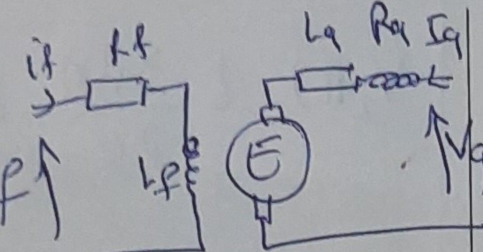
__à t=0 en ouvre K.__

1. Déterminer la loi de variation de $i(t)$, $V_L(t)$?
2. Tracer l'allure $i(t)$ et $V_L(t)$?



EX1 10pts

$i_q(t), \omega(t)$?



$$\begin{cases} V_f = R_f i_f + L_f \dfrac{di_f}{dt} \longrightarrow (1) \\ V_q = R_q i_q + L_q \dfrac{di_q}{dt} + M_{qf}\, i_f \cdot \omega \longrightarrow (2) \\ C_e - C_r = J \dfrac{d\omega}{dt} + f\cdot\omega \longrightarrow (3) \end{cases}$$

1

App. T.L. éq(2) et eq(3)

$$\begin{cases} \dfrac{V_q}{p} = (R_q + L_q p)\, I_q(p) + K_{qf}\cdot \omega(p) \\ -\dfrac{C_r}{p} = -K_{qf}\, I_q(p) + J p\, \omega(p) \end{cases}$$

$$\Downarrow$$

$$\begin{bmatrix} \dfrac{V_q}{p} \\ -\dfrac{C_r}{p} \end{bmatrix} = \begin{bmatrix} (R_q + L_q p) & +K_{qf} \\ -K_{qf} & J p \end{bmatrix} \begin{bmatrix} I_q(p) \\ \omega(p) \end{bmatrix}$$

1

donc, $I_q(p) = \dfrac{\begin{vmatrix} \frac{V_q}{p} & K_{qf} \\ -\frac{C_r}{p} & Jp \end{vmatrix}}{\Delta}$, $\omega(p) = \dfrac{\begin{vmatrix} R_q + L_q p & \frac{V_q}{p} \\ -K_{qf} & -\frac{C_r}{p} \end{vmatrix}}{\Delta}$

$$\Delta = L_q J \left(p^2 + \frac{R_q}{L_q} p + \frac{K_{qf}^2}{L_q J} \right)$$

$$\rightarrow \boxed{I_q(p) = \frac{\frac{V_q}{L_q} p + \frac{K_{qf} C_r}{L_q J}}{p\left(p^2 + \frac{R_q}{L_q} p + \frac{K_{qf}^2}{L_q J}\right)}}$$

$$\boxed{\omega(p) = \frac{-\left[\frac{C_r}{J} p - \frac{V_q K_{qf}}{L_q J} + \frac{C_r R_q}{L_q J}\right]}{p\left[p^2 + \frac{R_q}{L_q} p + \frac{K_{qf}^2}{L_q J}\right]}}$$

$$\boxed{I_q(p) = \frac{1000 p + 20}{p(p^2 + 10 p + 10)}}$$

1

$$\boxed{\omega(p) = \frac{-2 p + 980}{p(p^2 + 10 p + 10)}}$$

1