(1)

I 1 a) $R_{AN} = R_1 + R_2 + R_3 + R_4$ (1) si R 0,5

b) $E = (R + R_{AN})\, I$

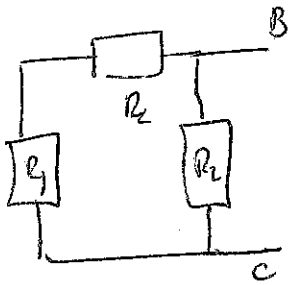
$I = \dfrac{E}{R + R_{AN}}$ $\quad U = \dfrac{RE}{R + R_1 + R_2 + R_3 + R_4}$ (1,5)

2-

k_1	k_2	k_3	k_4	R_{AN}	U
1	0	0	0	4 kΩ	1 V
1	0	0	0	0	5 V
0	1	0	0	1 kΩ	2,5 V
0	0	1	0	2 kΩ	1,67 V
0	0	0	1	3 kΩ	1,2 V

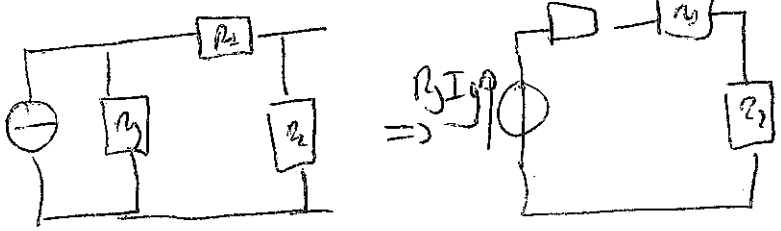
1 si seulement. (2,5)

II 1. a)



$R_{th} = \dfrac{R_2 (R_g + R_1)}{R_2 + R_g + R_1}$. (2)

b)



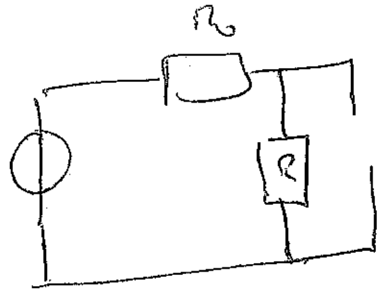
$E_{th} = \dfrac{R_2\, R_g\, I_g}{R_2 + R_1 + R_g}$ (2)

II a) $I = \dfrac{E_{th}}{R_{th} + R}$ (1)

b) $I = \dfrac{\dfrac{R_2 R_g I_g}{R_1 + R_2 + R_g}}{R + \dfrac{R_2 (R_g + R_1)}{R_2 + R_1 + R_g}} = \dfrac{R_2 R_g I_g}{R(R_1 + R_2 + R_g) + R_2 (R_g + R_1)}$ (2)

②

III-1. Régime permanent.



$u = \frac{R}{R_0+R} E$

$i_C = 0$

$i_R = \frac{E}{R+R_0}$ 1,0 = 2×0,5

$i = i_R$

III.2 à $t \geq 0^+$, continuité de la tension aux bornes de u_C $u_C = 0$ donc 0,5

$\Rightarrow i_R(t=0) = 0$; $i(t=0)$ $i_C(t=0) = \frac{E}{R_0}$ 0,5 1,0

III-3 $u = R i_R \longleftrightarrow i_C = C \frac{du}{dt}$ (0,5 pour deux !)

$i_C = RC \frac{di_R}{dt}$ / 0,5 1,0

III.4. $E - R_0 i - R i_R = 0$

$E - R_0 i_R - R_0 i_C - R i_R = 0$

$(R_0+R) i_R + R_0 i_C = E$

$(R_0+R) i_R + R_0 RC \frac{di_R}{dt} = E$

$\frac{di_R}{dt} + \frac{R_0+R}{R_0 RC} i_R = \frac{E}{R_0 RC}$ 1 si ça marche ① ②

$\tau = \frac{R_0 RC}{R_0+R}$

5- $i_{Rp} = \frac{E}{R_0+R}$ $i_{RH} = A e^{-\frac{t}{\tau}}$

à $t=0$; $i_R = 0$ $\Rightarrow$ $i_R = \frac{E}{R_0+R}\left(1 - e^{-\frac{t}{\tau}}\right)$ ①

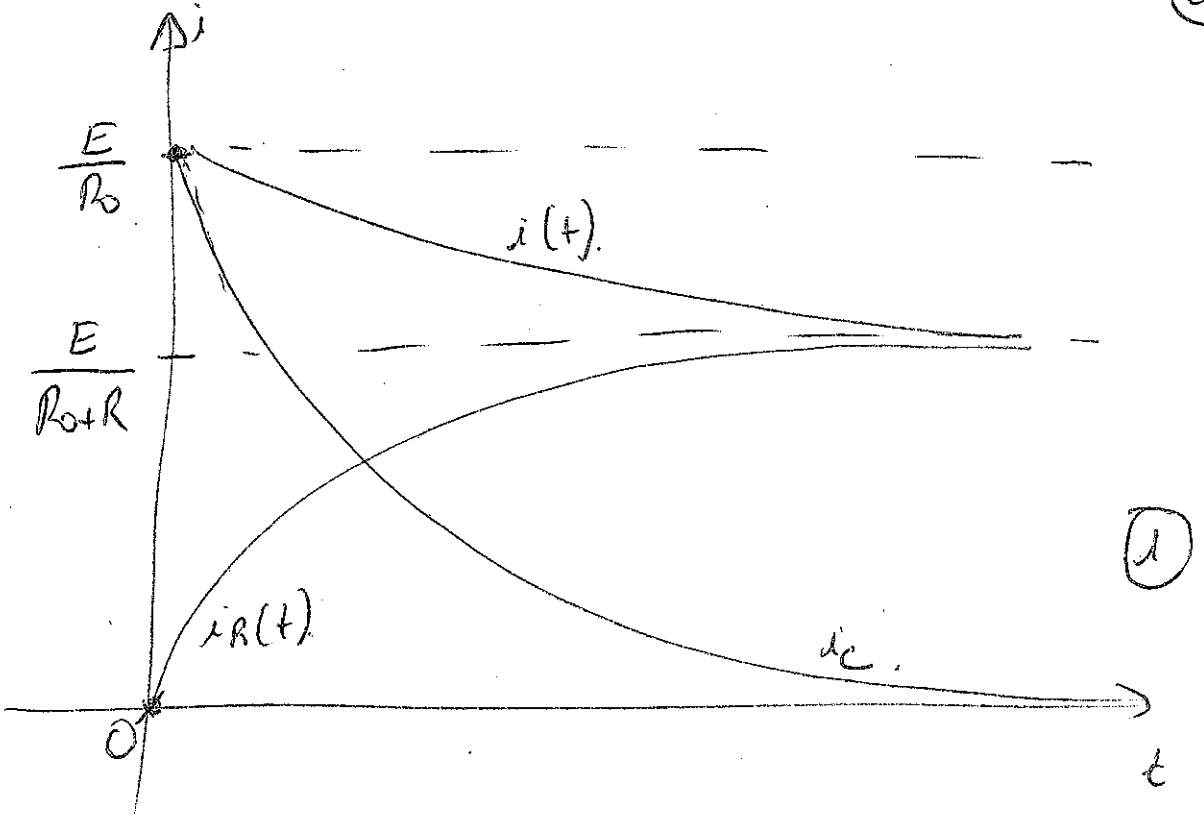
(3)

$$i_C = RC\frac{di_R}{dt} = \frac{RE}{R_0+R}\frac{1}{\tau}e^{-\frac{t}{\tau}}$$

$$i_C = \frac{RCE}{R_0+R}\cdot\frac{R_0+R}{R_0RC}e^{-\frac{t}{\tau}}$$

$$i_C = \frac{E}{R_0}e^{-\frac{t}{\tau}} \quad (0{,}5)$$

$$i = i_C + i_R = \frac{E}{R_0}e^{-\frac{t}{\tau}} + \frac{E}{R_0+R}\left(1-e^{-\frac{t}{\tau}}\right) \quad (0{,}5)$$



(1)