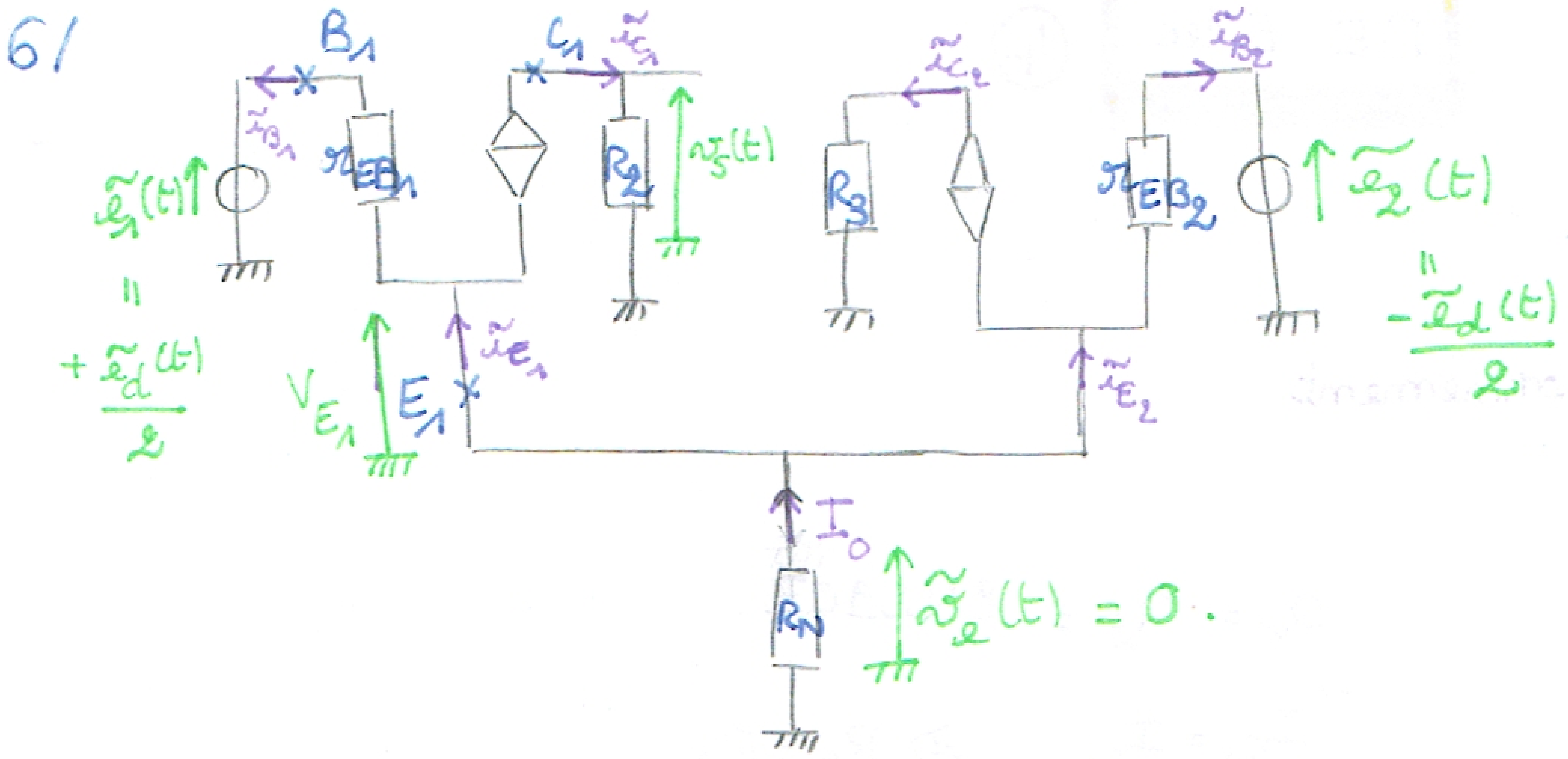
6/



7/ → mode différentiel pur $\Rightarrow e_{MC} = 0$

$$\begin{cases} e_1(t) = e_{MC}(t) + \frac{e_d(t)}{2} \\ e_2(t) = e_{MC}(t) - \frac{e_d(t)}{2} \end{cases} \Leftrightarrow \begin{cases} e_{MC}(t) = \frac{e_1(t)+e_2(t)}{2} \\ e_d(t) = e_1(t) - e_2(t) \end{cases}$$

d'où $e_1(t) = \frac{e_d(t)}{2}$ $\quad e_2(t) = \frac{-e_d(t)}{2}$

→ impédance d'entrée différentielle : $R_{e_{diff}} = \frac{\tilde{e}_d(t)}{\tilde{i}_{B_1}(t)}$

avec $\frac{\tilde{e}_d(t)}{2} + \tilde{i}_{B_1} r_{EB_1} - \tilde{i}_{B_2} r_{EB_2} + \frac{\tilde{e}_d(t)}{2} = 0$

$$\Rightarrow \tilde{e}_d(t) = + r_{BE}(\tilde{i}_{B_2}(t) - i_{B_1}(t)) = -2 r_{BE}\, \tilde{i}_{B_1}(t)$$

$\tilde{i}_{B_1} = -\tilde{i}_{B_2}$ (à prouver).

d'où $R_{e_{diff}} = 2 r_{BE}$

Calcul du gain différentiel :

* $\tilde{i}_{E_1} + \tilde{i}_{E_2} = 0 \Rightarrow \tilde{i}_{E_1} = -\tilde{i}_{E_2} \Rightarrow \tilde{i}_{B_1} = -\tilde{i}_{B_2}$.
* $v_S(t) = R_2 \beta\, \tilde{i}_{B_1}(t) = -R_2\beta \frac{\tilde{e}_d(t)}{2 r_{BE}}$ avec $r_{BE} = \frac{U_T}{I_{B0}}$
* $A_d = \frac{\tilde{v}_S(t)}{\tilde{e}_d(t)} = -R_2\beta \times \frac{1}{2 r_{BE}} = -R_2\beta\frac{I_{B0}}{2U_T} = -R_2 \frac{I_{C0}}{2U_T}$ $I_{C0} = 125\,\mu A$ avec $U_T = 25\,mV$

$A_d = -36 \quad \Rightarrow \boxed{G = 20\log(1/36) = -31,12}$