

TD 2

Canaux de transmission

Exercice 1

(1) $y_L = 1 + 1,8j = Y_L \times R_c$

$z_L = 0,2 - 0,42j \Rightarrow Z_L = Z_0 - 1,2j$

$\rho = 0,62$

(2) $Z_c = ?$

$\frac{P}{\lambda} = \frac{80}{20} = 4,25$

$$\begin{cases} Z_L = Z_0 \times R_c \\ Y_L = \frac{Y_0}{R_c} \end{cases}$$

En part de Z_L vers le générateur, on fait 3 bous + 1/2 bous. Donc on revient sur Y_L

$z_c = Y_L = 1 + 1,8j \Rightarrow Z_c = 100 + 180j$

Longue adaptée en entrée car $Z_c \neq R_c$

(3) $d=0$, stub directement sur la charge car à cet endroit la partie réelle est $= R_c$ (partie réelle déjà adaptée)

(4) $\frac{s}{\lambda} = 0,08$

Exercice 2

(1) $Z_L = 15 - 42,5j$

$z_L = \frac{15 - 42,5j}{50} = 0,3 - 0,85j$

$y_L = 0,4 + j$

$\rho = 0,65$

(2) $\lambda = \frac{c}{f} = \frac{3 \cdot 10^8}{1 \cdot 10^9} = 0,3 \text{ m}$

$\frac{d}{\lambda} = 0,185 - 0,133 = 0,052$

$\frac{d'}{\lambda} = 0,314 - 0,133 = 0,181$

$d = 1,6 + 15k \text{ cm}$

$d' = 5,5 + 15k \text{ cm}$

3) Stub en circuit ouvert $Z \rightarrow \infty$

$$y \rightarrow 0$$

$$C: \text{il faut ajouter en // } 1,9 \text{ j} \Rightarrow \frac{1}{s} = 9,327 \Rightarrow s = 9,327 \text{ cm}$$

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$$4) g = -1,9 \text{ j} = \frac{1}{x} \Rightarrow x = \frac{1}{-1,9 \text{ j}} = \frac{j}{1,9} \Leftrightarrow \frac{1}{sC\omega} \Rightarrow L = 84 \text{ pF}$$

$$g = 1,9 \text{ j} = X = \frac{1}{sC\omega} \Rightarrow C = 302 \text{ pF}$$

(1,9 = $C \cdot \pi \cdot 2 \cdot 10^3$)

Exercice 2 bps

$$1) R_g = \frac{1}{3} R_c, R_t = \frac{1}{3} R_c$$

$$\Gamma_c = \frac{R_g - R_c}{R_g + R_c}$$

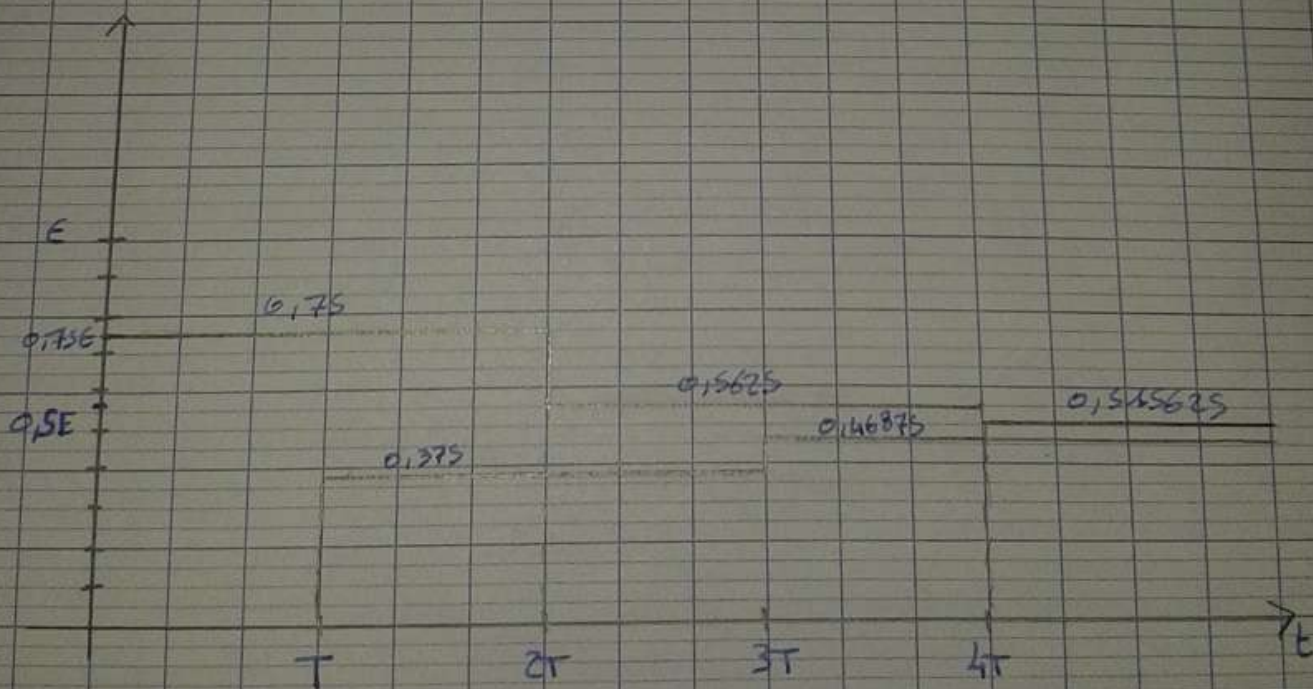
$$\Gamma_t = \frac{R_c - R_g}{R_c + R_g}$$

$$U_t(t) = \frac{R_c}{R_g + R_c} (1 + \Gamma_t) [e(t-T) + \Gamma_c \Gamma_t e(t-3T) + \dots]$$

$$U_c(t) = \frac{R_g + R_c}{R_g + R_c} e(t) + \frac{R_c}{R_g + R_c} (1 + \Gamma_t) \Gamma_t [e(t-2T) + \Gamma_c \Gamma_t e(t-4T) + \dots]$$

$$U_t(t) = \frac{3}{8} [e(t-T) + \frac{1}{4} e(t-3T) + \dots]$$

$$U_c(t) = \frac{3}{4} e(t) - \frac{3}{16} [e(t-2T) + \frac{1}{4} e(t-4T) + \dots]$$

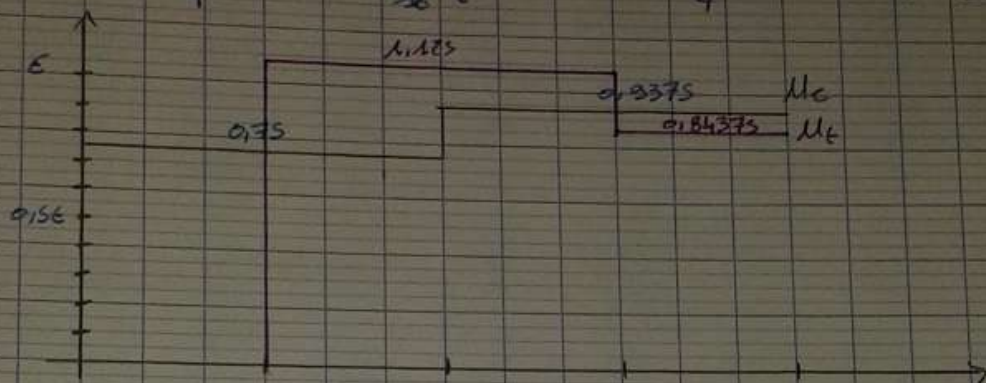


$$2) R_g = \frac{1}{3} R_c, R_b = 3 R_c$$

$$\Gamma_c = -\frac{1}{2} \quad \Gamma_b = \frac{1}{2}$$

$$U_c(t) = \frac{3}{8} [c(t-T) - \frac{1}{4} c(t-3T) + \dots]$$

$$U_c(t) = \frac{3}{4} c(t) + \frac{3}{16} [c(t-2T) - \frac{1}{4} c(t-4T) + \dots]$$



Exercice 3

$$2) R_g = R_c$$

$$R_b =$$

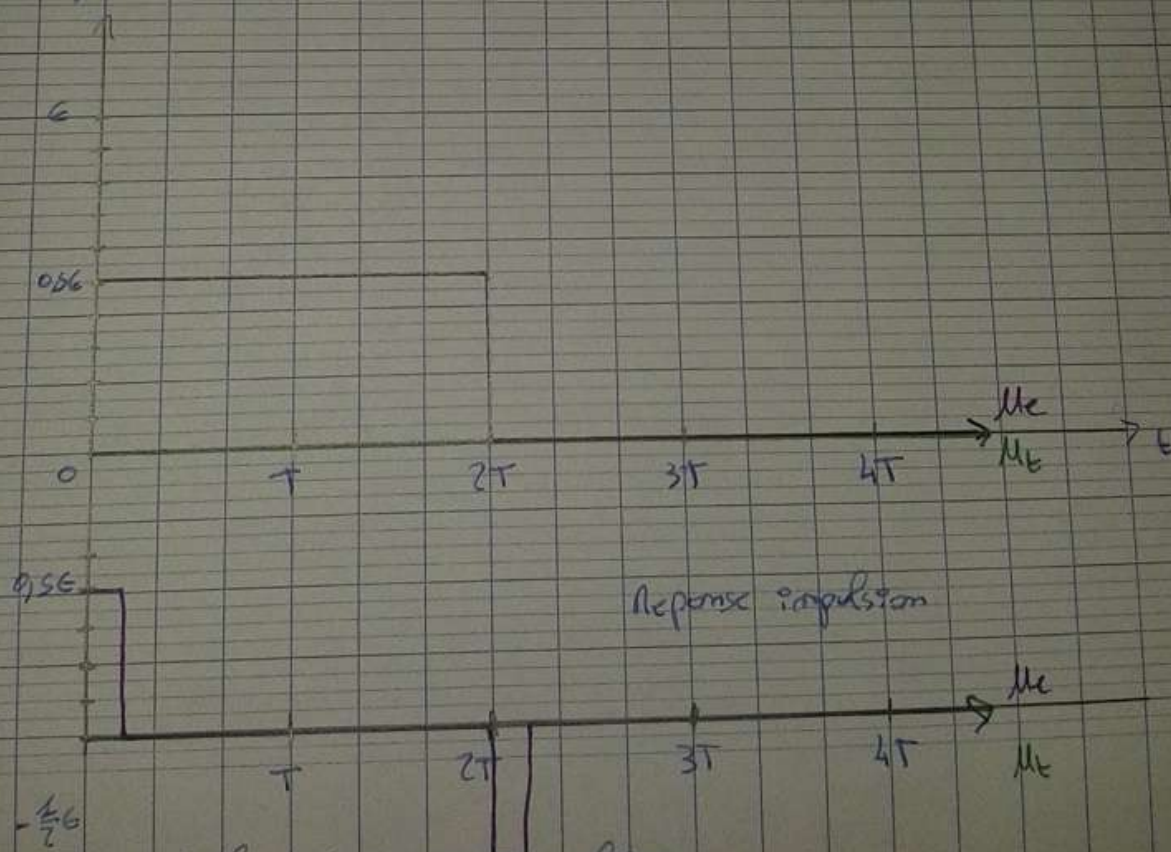
$$\Gamma_c = 0$$

$$\Gamma_b = -\frac{R_c}{R_c} = -1$$

Réponse à un échelon

$$U_b(t) = \frac{1}{2} \times 0 = 0$$

$$U_c(t) = \frac{1}{2} c(t) = \frac{1}{2}$$



Un échelon donne une impulsion.

$$\begin{aligned}
 1) \quad R_g &= R_c \\
 R_L &= \infty \\
 \Gamma_c &= \frac{R_g - R_c}{R_g + R_c} = 0 \\
 \Gamma_L &= \frac{R_L - R_c}{R_L + R_c} = 1
 \end{aligned}$$

$$V_L(t) = \frac{R_c}{R_g + R_c} (1 + \Gamma_c) [e^{-(t-\tau)} + 2\Gamma_L e^{-(t-2\tau)}]$$

$$V_L(t) = \frac{1}{2} (1 + \Gamma_c) [e^{-(t-\tau)}]$$

$$V_L(t) = e^{-(t-\tau)}$$

$$V_c(t) = \frac{1}{2} e^{-(t)} + \frac{1}{2} (1 + \Gamma_c) \Gamma_c [e^{-(t-2\tau)} + \dots]$$

$$V_c(t) = \frac{1}{2} e^{-(t)} + \frac{1}{2} e^{-(t-2\tau)}$$

