

Exo 1 1] $H(s) = \frac{s}{2s+7}$ $E(s) = \frac{1}{s}$ $S(s) = \frac{s}{s(2s+7)}$

$$S(s) = \frac{a}{s} + \frac{b}{2s+7} = \frac{a(2s+7) + b(-1)}{s(2s+7)} = \frac{2a + 7a - b}{s(2s+7)}$$

$$\Rightarrow a = \frac{s}{7} \quad b = -\frac{8}{7} \Rightarrow S(s) = \frac{s}{7} \left(1 - \frac{2}{2s+7} \right)$$

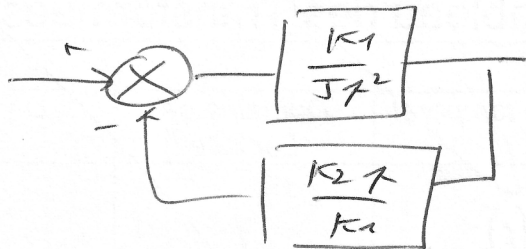
$$S(s) = \frac{s}{7} \left(1 - \frac{1}{s + 3.5} \right) \Rightarrow s(t) = \frac{s}{7} \left(1 - e^{-\frac{7}{2}t} \right) u(t)$$

2] $H(s) = \frac{7}{s^2 + 10s + 25}$; $E(s) = 1$

$$S(s) = \frac{7}{s^2 + 10s + 25} = \frac{\frac{7}{5} \times 5}{(s+5)^2 + 16}$$

$$s(t) = \frac{7}{5} e^{-5t} \sin(4t) \cdot u(t)$$

Exo 2 1] $T(s) = \frac{1}{Js^2}$ 2]



$$H(s) = \frac{\frac{K_1}{Js^2}}{1 + \frac{K_1}{Js^2} \times \frac{K_2}{K_1} s} = \frac{K_1}{Js^2 + K_2s} = \frac{K_1}{s(Ts + K_2)}$$

Exo 3 1] Schéma bloc 2] $K_n = \frac{K_c}{K_n}$ 3] Schéma bloc moteur

$$4] H_m(s) = \frac{k_c}{Js(R+Ls) + k_c k_e} = \frac{1/k_e}{\frac{JL}{k_c k_e} s^2 + \frac{JR}{k_c k_e} s + 1}$$

5] Conclure $\Rightarrow H_m(s) = \frac{K_m}{1 + \tau_m s}$

$$s(\infty) = 530$$

$$K_m = \frac{530}{70} = 53 \text{ rad/s}^2$$

$$1.05 s(\infty) = 556 \Rightarrow t_{sx} = 0.07s$$

$$0.95 s(\infty) = 507 \Rightarrow t_{sx} = 3\tau \Rightarrow \tau = 0.023$$

② 6] $Q_4 \rightarrow 2^{\text{e}} \text{ ordre}$
 $Q_5 \rightarrow 1^{\text{e}} \text{ ordre}$ $\Rightarrow$ on peut néglier L

7] $H(\tau) = \frac{K_c C_a K_m}{\tau (1 + \tau \tau)}$

8] $H_2(\tau) = \frac{25}{\tau (1 + 0,05 \tau) + 25} = \frac{1}{\frac{\tau^2}{500} + \frac{\tau}{25} + 1}$

$\omega_0 = \sqrt{500} = 10\sqrt{5}$ $K_2 = 1$

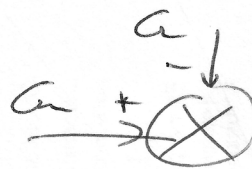
$\frac{2\zeta}{\omega_0} = \frac{1}{25} \Rightarrow \zeta = \frac{1}{\sqrt{5}} = 0,44$

Précis

Dépassements $> 5\%$

9] Curve $\Rightarrow$ $\left\{ \begin{array}{l} D = 21\% \\ t_{5\%} = 0,25 \text{ s} \\ \Sigma(\infty) = 0 \end{array} \right. \Rightarrow \left\{ \begin{array}{l} D \text{ trop élevée} \\ t_{5\%} \text{ trop rapide} \\ \text{Précision OK} \end{array} \right.$

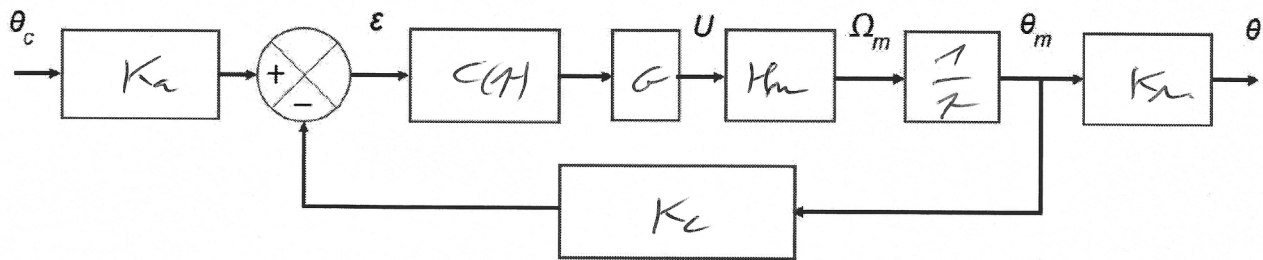
10] Perturbation au niveau de C_u



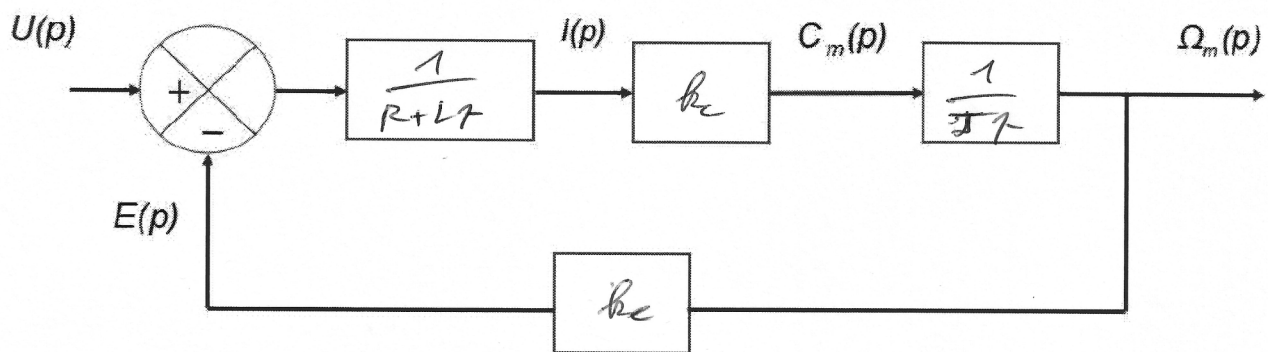
11] 2 possibilités: $\left\{ \begin{array}{l} \tau_i = 10 \\ K = 0,1 \end{array} \right. \quad \left\{ \begin{array}{l} \tau_i = 100 \\ K = 0,1 \end{array} \right.$

DS PCSI1, octobre 2025, document réponses

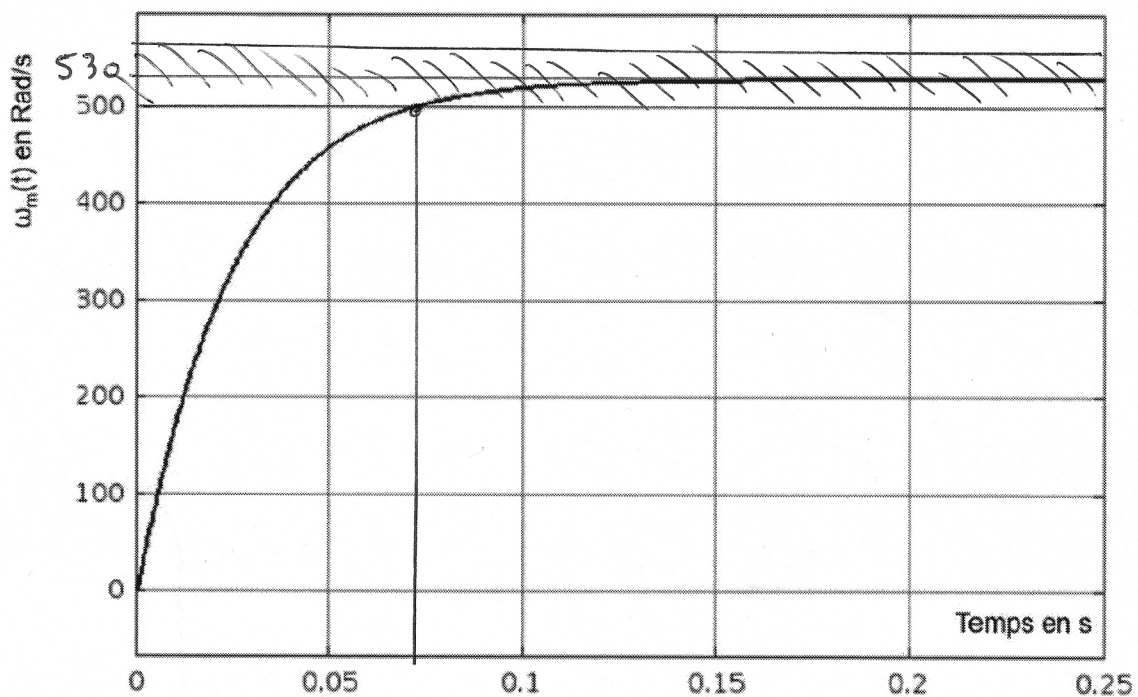
Question 1.



Question 3.

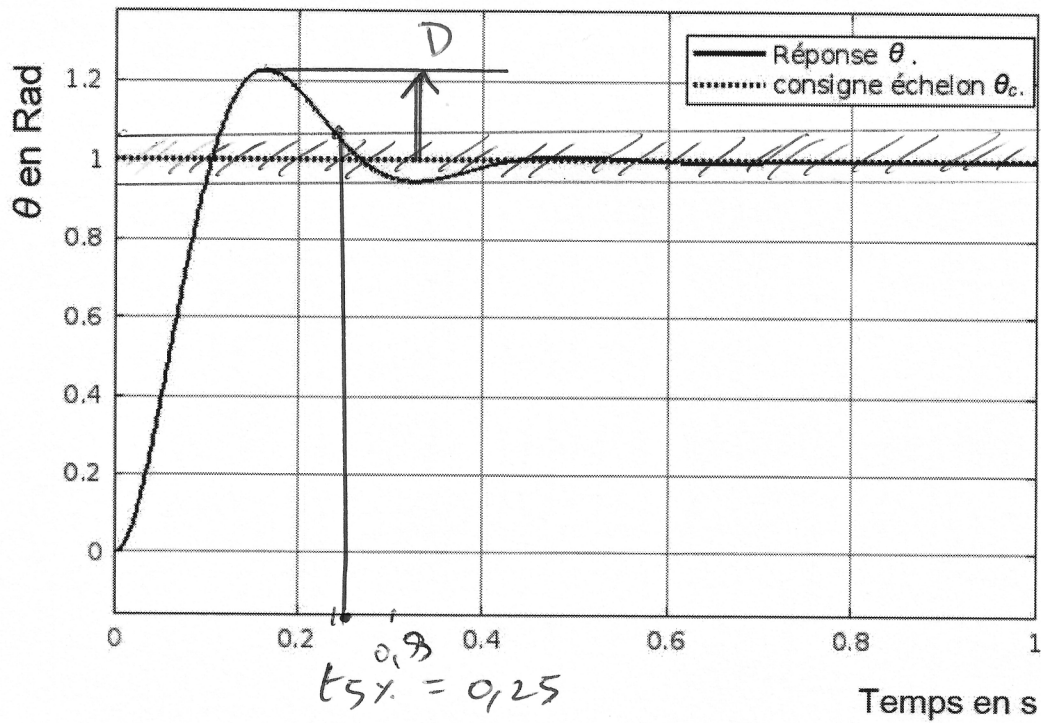


Question 5.



$$t_{5\%} = 0,07 \text{ s} = 3\tau \Rightarrow \tau =$$

Question 9.



Question 11.

