

Solution : Exercice 1

Q1a

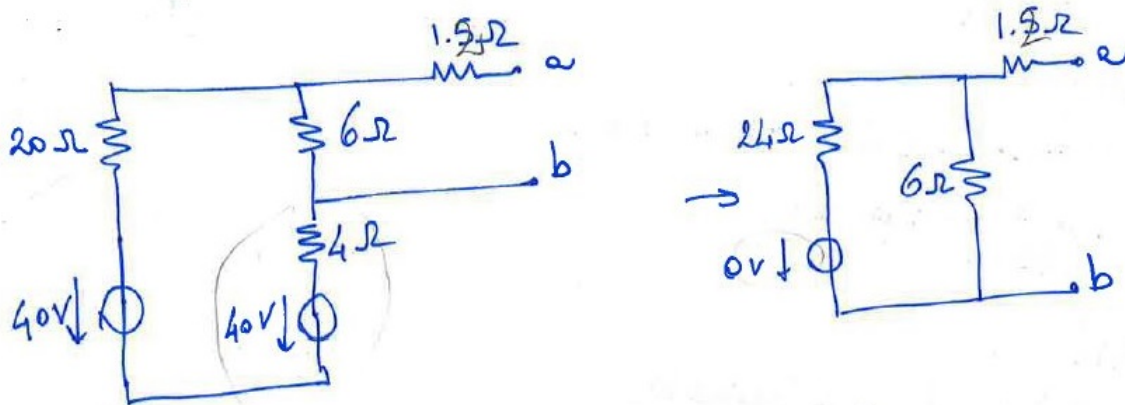
$$R_{eq} = \frac{9}{6} + 1.7 + 10 = 13.2\Omega$$

Q1b

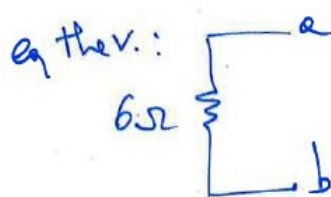
$$P_{diff} = \frac{2^2}{13.2} = 0.302W$$

Solution : Exercice 2

Q2



$$R_{eq} = 1.2\Omega + \frac{24 \times 6}{24 + 6}\Omega = 6\Omega$$



Solution : Exercice 3

Q3a

$$C = \frac{Q}{U} \Leftrightarrow Q = C \cdot U = 7\mu F \cdot 9V = 63\mu C$$

$$I = \frac{9V}{45\Omega} = 200mA$$

Q3b

Décharge de C à travers R_2 :

$$i_c =$$

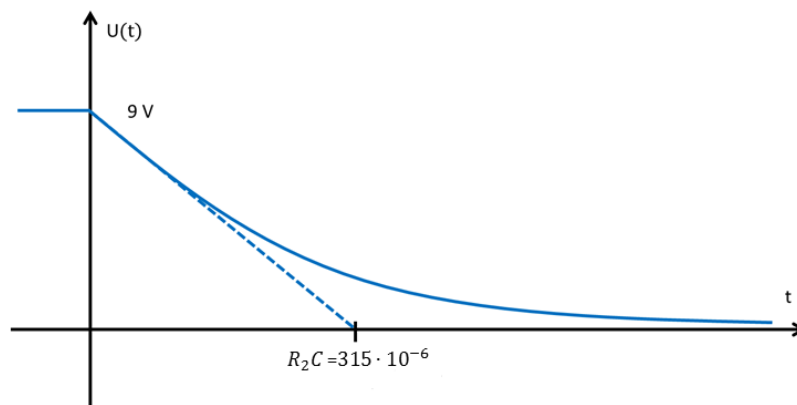
$$i_c = -i = \frac{v}{R_2}$$

Donc :

$$\frac{v}{R_2} = C \frac{dv_c}{dt}$$

$$\Rightarrow v_c = 9e^{-\frac{t}{R_2 C}}$$

Q3c



Q3d

$$I(t) = \frac{U_0}{R} \cdot e^{-\frac{t-t_0}{CR}}$$

$$I(0.5ms) = \frac{9 \cdot e^{-\frac{0.5}{0.315}}}{45} = 0.04A$$

$$I(1ms) = 0.008A$$

Solution : Exercice 4

Q4a

$$H(\omega) = \frac{R + j\omega L}{R + j\omega L + \frac{1}{j\omega C}} = \frac{j\omega C(R + j\omega L)}{1 + jC(R + j\omega L)}$$

$$H(\omega) = \frac{-\omega^2 LC + j\omega RC}{1 - \omega^2 LC + j\omega RC}$$

Q4b

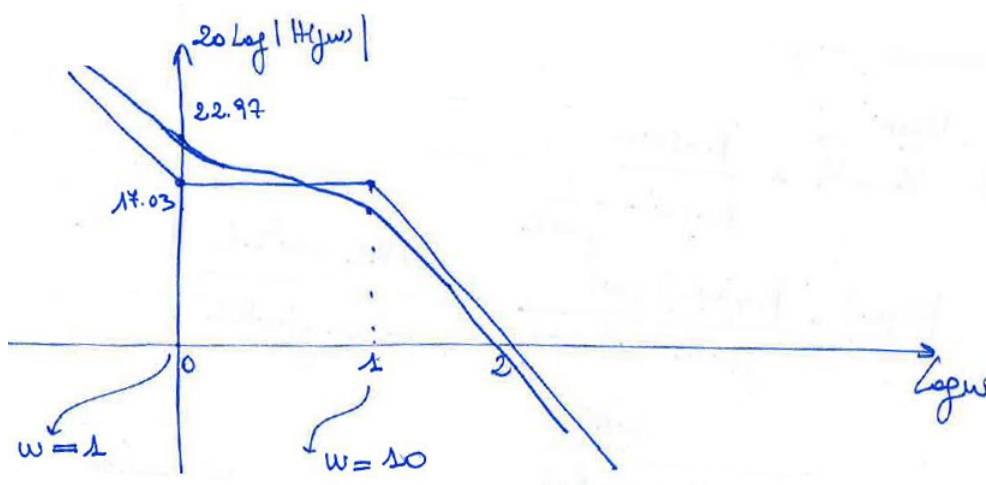
$$|H(\omega \rightarrow 0)| = \omega RC \xrightarrow{\omega \rightarrow 0} 0$$

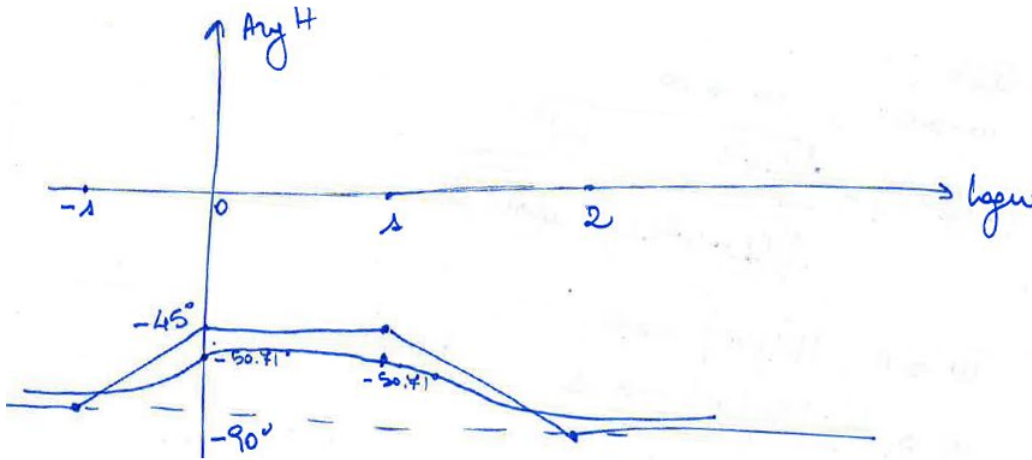
$$|H(\omega \rightarrow \infty)| = 1$$

⇒ Passe haut

Solution : Exercice 5

Q5a





Q5b

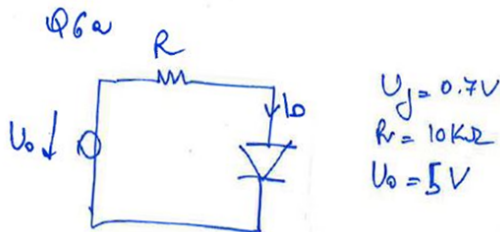
$$20\log|H|_{\omega_1} = 20 + 3.01 - 43.21 = 22.97\text{dB}$$

$$20\log|H|_{\omega_2} = 20 + 20.04 - 20 - 3.01 = 17.03\text{dB}$$

$$\text{Arg}H|_{\omega_1} = 0^\circ + 45^\circ - 90^\circ - 5.71^\circ = -50.71^\circ$$

$$\text{Arg}H|_{\omega_2} = 0^\circ + 84.29^\circ - 90^\circ - 45^\circ = -50.71^\circ$$

Solution : Exercice 6



$I_D (U_0 = 5\text{V}) :$

$$U_0 - U_J - R I_D = 0 \quad I_D = \frac{U_0 - U_J}{R} = \frac{5 - 0.7}{10 \cdot 10^3} = 4.3 \cdot 10^{-4} \text{A}$$

