LE DIPOLE RC

II

1. Loi des mailles :

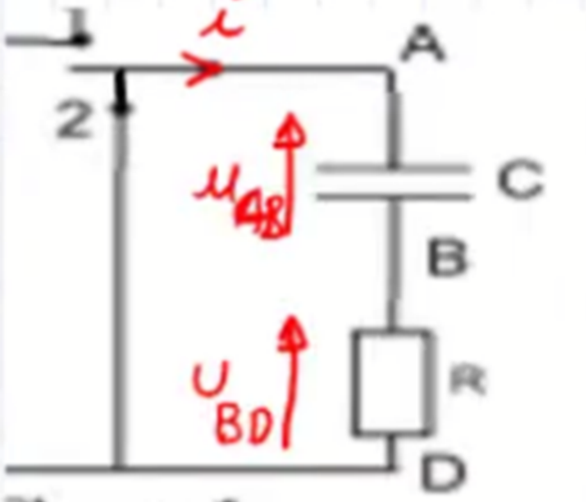


Figure 1

$$u_{BD} + u_{AB} = 0$$

$$Ri + u_{AB} = 0$$

$$\text{or } i = \frac{dq}{dt} = C \cdot \frac{du_{AB}}{dt}$$

$$\boxed{RC\frac{du_{AB}}{dt} + u_{AB} = 0} \quad (2)$$

2. $\boxed{u_{AB} = E e^{-\alpha t}}$

$$\frac{dE}{dt} = E(-\alpha e^{-\alpha t}) = -\alpha E e^{-\alpha t}$$

$$-RC\alpha E e^{-\alpha t} + E e^{-\alpha t} = 0$$

$$E e^{-\alpha t}(1 - RC\alpha) = 0$$

$$1 - RC\alpha = 0 \Rightarrow \boxed{\alpha = \frac{1}{RC} = \frac{1}{\tau}}.$$

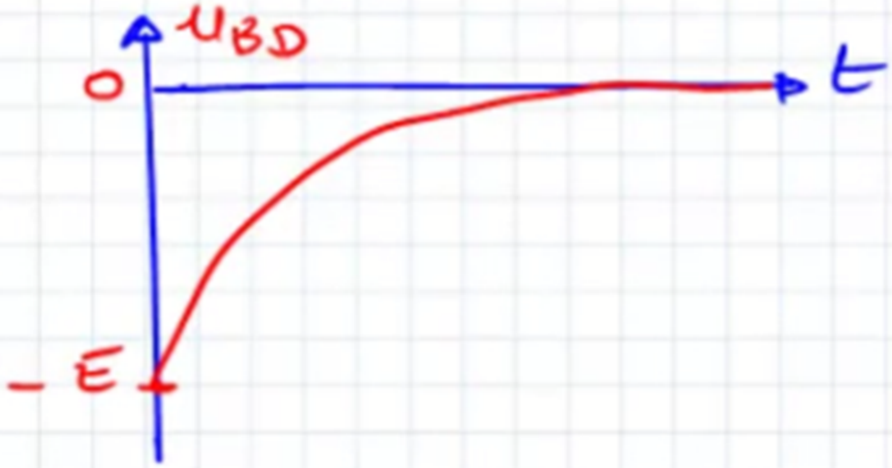
3 a. $u_{BD} = - u_{AB}$

A $t=0 \Rightarrow u_{AB} = E \Rightarrow \boxed{u_{BD} = -E = -5V}$

b. $u_{BD}(t) = - u_{AB}(t)$

$$\boxed{u_{BD}(t) = - E\, e^{-t/\tau}}$$

4. lorsque $t \to \infty \Rightarrow u_{BD} \to 0$.



$$E_e = \frac{1}{2} C \cdot u_c^2 = \frac{1}{2} C E^2$$

$$E_e = \frac{1}{2} 100.10^{-9} \times 5^2 = 1,25.10^{-6} J.$$