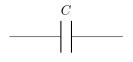
• Capacitance: energy storage components.

•

$$C = rac{Q}{V}$$
 Farads (F)

• Symbol



$$+$$
 $\begin{vmatrix} V_c \\ - \end{vmatrix}$ C polarized

•

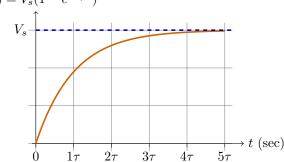
$$V_c = \frac{1}{C} \int_{-\infty}^t I_c dt \tag{1}$$

•

$$I_c = C \frac{dV_c(t)}{dt} \tag{2}$$

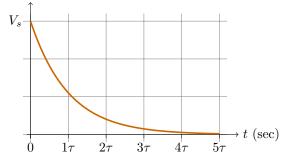
- Current through a capacitor is zero unless the voltage is changing.
- A useful quantity to use in describing how fast or slow a capacitor charges is $\tau = RC$ (seconds) known as the *time constant*.
- Capacitor charges over time following an exponential curve

$$V_c(t) = V_s(1 - e^{-t/\tau})$$



• Capacitor discharges over time following an exponential curve





• Time constant may be estimated as

$$\tau \approx \frac{t_{90} - t_{10}}{2.2}$$

where t_{10} is the time to reach 10% of V_s and t_{90} is the time it takes to reach 90% of V_s .

