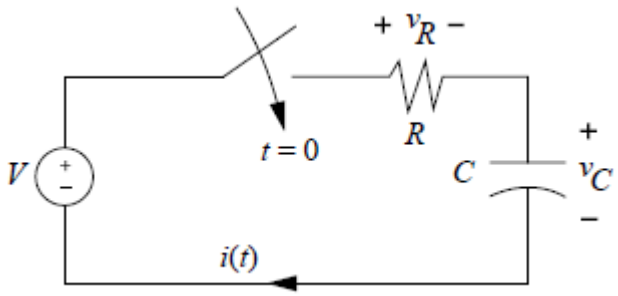
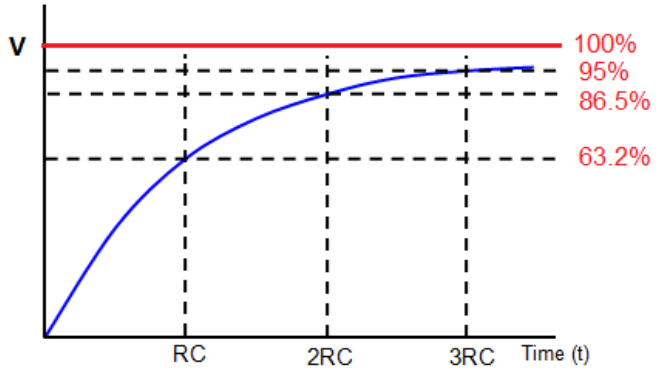
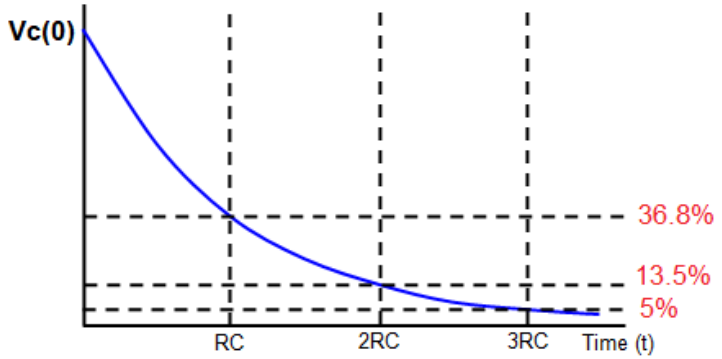
RC Transient response

STUDY FOR FE







$Time\ t \geq 0 \quad Initial\ voltage\ across\ capacitor\ -\ v_c(0) \quad Time\ constant\ \tau = RC \quad Applied\ Voltage = V$

$$v_c(t) = v_c(0)e^{-\frac{t}{RC}} + V\left(1 - e^{-\frac{t}{RC}}\right)$$

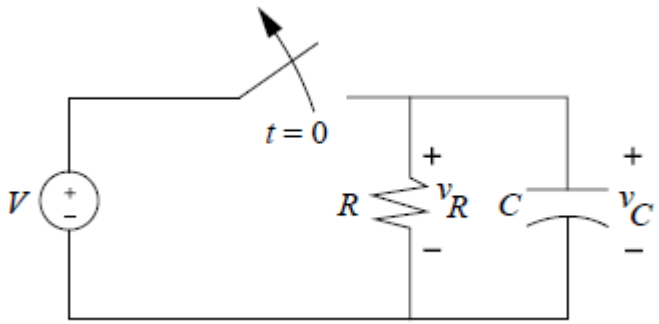
$$i(t) = \frac{[V - v_c(0)]}{R} e^{-t/RC}$$

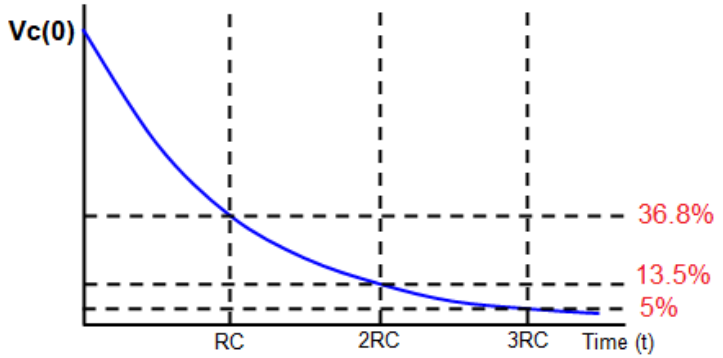
$$v_R(t) = i(t)R = [V - v_c(0)]e^{-t/RC}$$

Time constant $\tau = RC$	% charged	% discharged
1	63.2%	36.8%
2	86.5%	13.5%
3	95%	5%
4	98.2%	1.8%
5	99.3%	0.7%

RC Transient response

STUDY FOR FE





$Time\ t \geq 0 \quad Initial\ voltage\ across\ capacitor\ -\ v_c(0) \quad Time\ constant\ \tau = RC \quad Applied\ Voltage = V$

$$v_c(t) = v_R(t) = Ve^{-\frac{t}{RC}}$$

$$i_R(t) = -i_C(t) = \frac{V}{R}e^{-t/RC}$$

Time constant $\tau = RC$	% charge remaining
1	36.8%
2	13.5%
3	5%
4	1.8%
5	0.7%