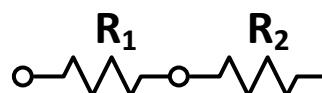


(a) Series:

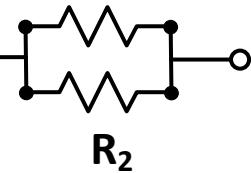
$$R_{eq} = \sum_{k=1}^N R_k$$



(b) Parallel:

$$\frac{1}{R_{eq}} = \sum_{k=1}^N \frac{1}{R_k}$$

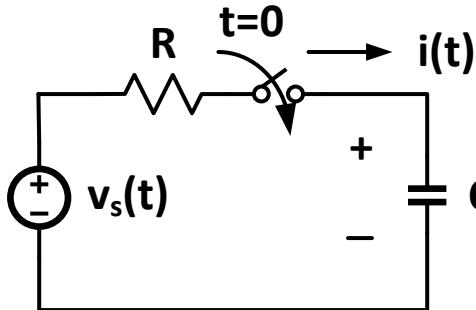
R_1



$$R_{eq} = R_1 + R_2$$

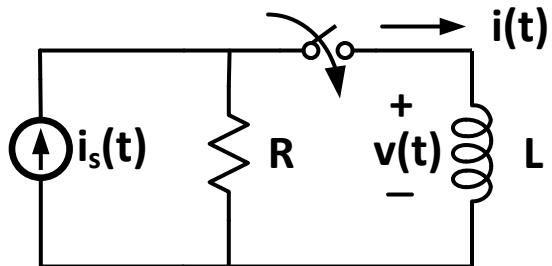
$$R_{eq} = \frac{R_1 R_2}{R_1 + R_2}$$

RC and RL Circuits

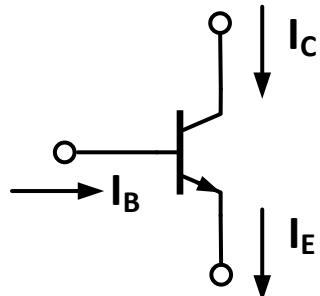


$$\tau = RC$$

$t=0$



$$\tau = \frac{L}{R}$$

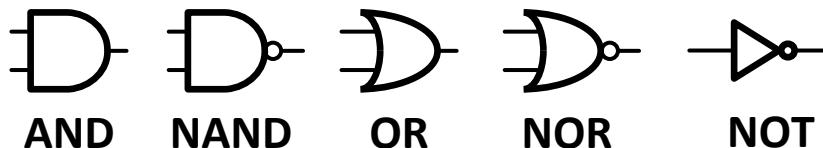


OFF: $V_{BE} < V_{BE}(\text{on})$, $I_B = I_C = I_E = 0$

FA: $V_{BE} = V_{BE}(\text{on})$, $I_C = \beta I_B$

SAT: $V_{BE} = V_{BE}(\text{on})$, $V_{CE} = V_{CE}(\text{sat})$

Basic Gates:



AND NAND OR NOR NOT

Selected rules of boolean algebra:

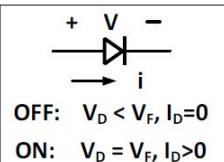
$$(a.b).c = a.(b.c); (a+b)+c = a+(b+c)$$

$$a.b = b.a; a+b = b+a$$

$$a.(b+c) = a.b + a.c$$

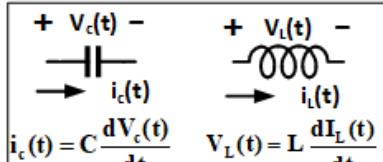
$$\text{NOT}(\text{NOT}(a)) = a$$

$$a + \bar{a}.b = a + b$$



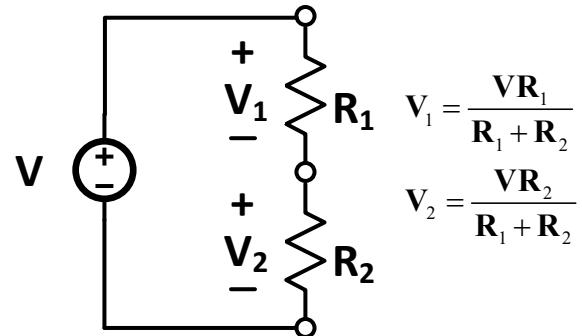
OFF: $V_D < V_F$, $I_D = 0$

ON: $V_D = V_F$, $I_D > 0$



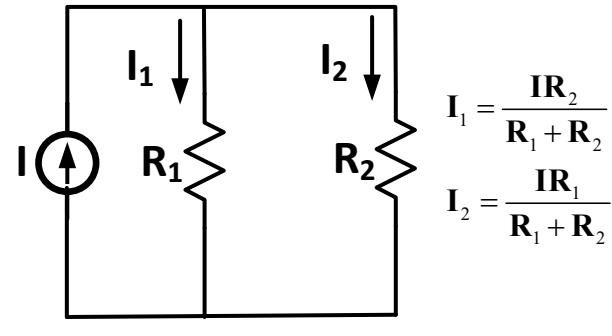
$$i_c(t) = C \frac{dV_c(t)}{dt} \quad V_L(t) = L \frac{dI_L(t)}{dt}$$

Voltage/Current Divider



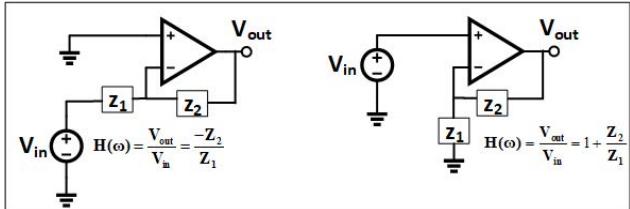
$$V_1 = \frac{VR_1}{R_1 + R_2}$$

$$V_2 = \frac{VR_2}{R_1 + R_2}$$



$$I_1 = \frac{IR_2}{R_1 + R_2}$$

$$I_2 = \frac{IR_1}{R_1 + R_2}$$



$$H(\omega) = \frac{V_{out}}{V_{in}} = -\frac{Z_2}{Z_1}$$

$$H(\omega) = \frac{V_{out}}{V_{in}} = 1 + \frac{Z_2}{Z_1}$$