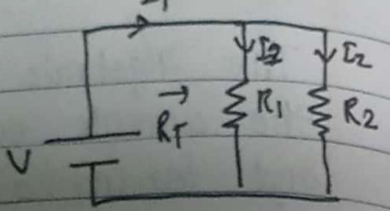
Current Divider Rule:

We know,



Source Current $(I_s) = \frac{V}{R_T}$

The voltage 'V' is the same across the parallel elements

$$V = I_1R_1 = I_2R_2 \quad \cdots [I_xR_x]$$

or, $I_T R_T = I_1R_1 = I_2R_2$

$$\therefore I_x = I_T \times \frac{R_T}{R_x}$$

The current through any branch of a parallel resistive network is equal to the ~~parallel network~~ total resistance of the parallel network divided by the resistor of interest and multiplied by the total amount entering the parallel configuration.

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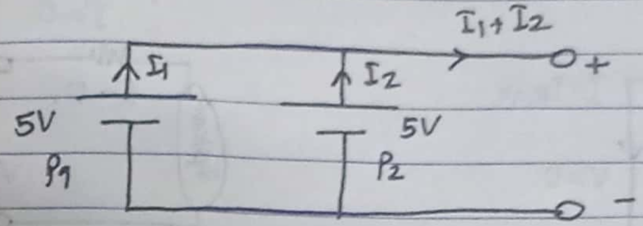
Voltage Source in Parallel



Here, $P_1 = I_1 \times V_1$

$P_2 = I_2 \times V_2$

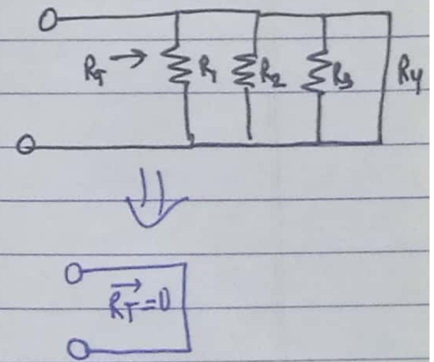
So,

$P_T = (I_1 + I_2) \times V = 2IV \quad (\because I_1 = I_2)$

$= 2P$

In parallel, the battery's connecting must have same voltage to prevent charging and discharging.

Short Circuit:



Here, $R_4 = 0$

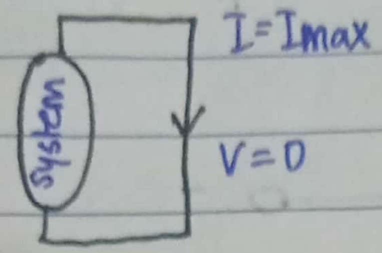
So,

$R' = \frac{R_3 R_4}{R_3 + R_4} = 0$

$R'' = \frac{R' R_2}{R' + R_3} = 0$

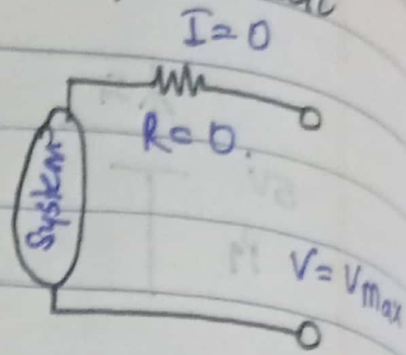
$R''' = \frac{R'' R_1}{R'' + R_2} = 0$

* Closed circuit



In closed circuit, current is maximum. and no voltage if unresistive.

* Open circuit



In open circuit, current is zero and the voltage is maximum

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