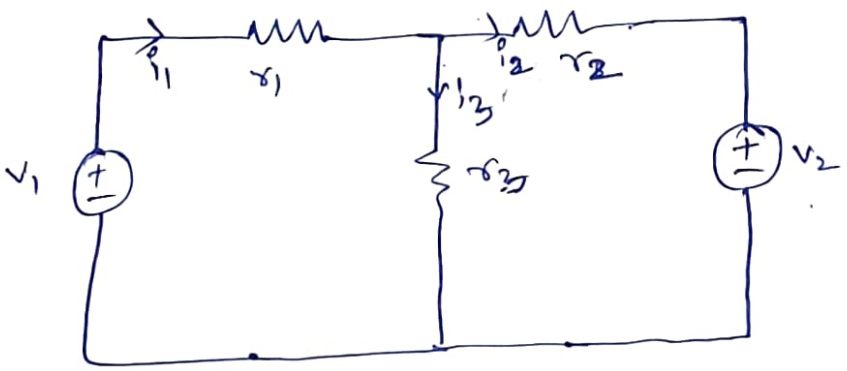
Super position theorem :

In any linear network containing two (or) more sources, the response in any element is equal to the algebraic sum of the response caused by individual sources acting alone, while the other sources are non-operative.

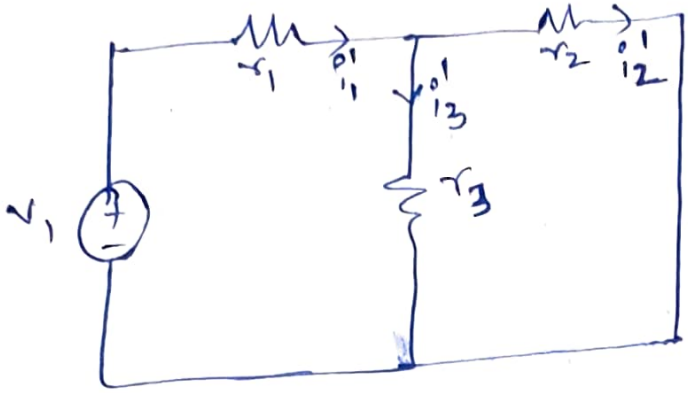
* while considering the effect of individual sources, other ideal voltage sources and ideal current sources in the network are replaced by short circuit and open circuit across their terminals.

* Superposition theorem is not valid for power responses, it is applicable for computing voltage and current responses.

* consider a circuit :



consider voltage source V_1 is acting and V_2 is short circuited.

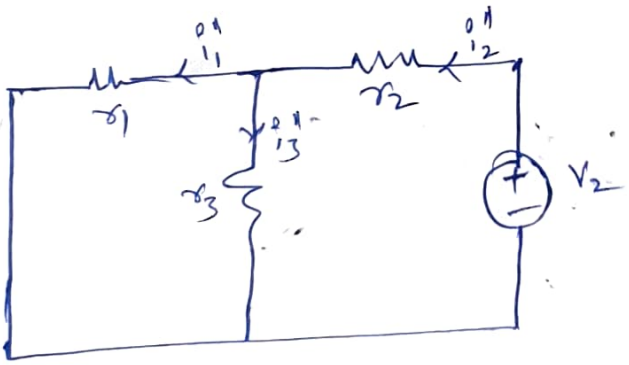


Here $i_1' = \dfrac{V_1}{\dfrac{r_2 r_3}{r_2 + r_3} + r_1}$

$i_2' = i_1' \dfrac{r_3}{r_2 + r_3}$

$i_3' = i_1' - i_2'$

* Now voltage sources V_2 is acting and V_1 is short circuited.



$$I_2'' = \frac{V_2}{\frac{r_1 r_3}{r_1 + r_3} + r_2}$$

$$I_1'' = I_2'' \frac{r_3}{r_1 + r_3}$$

$$I_3'' = I_2'' - I_1''$$

As per superposition theorem;

$$I_3 = I_3' + I_3''$$

$$I_2 = I_2' - I_2''$$

$$I_1 = I_1' - I_1''$$

* during application of superposition, the direction of currents calculated should be taken care.