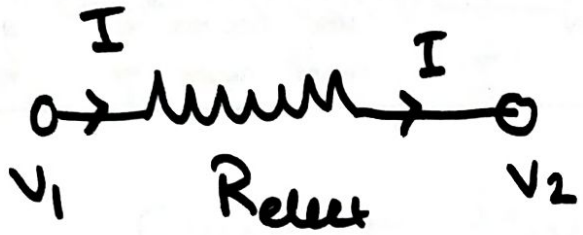
Electric Circuit



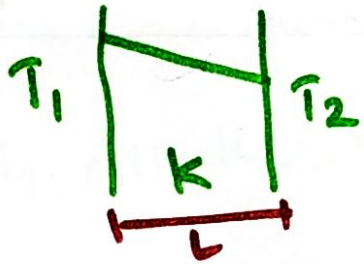
Ohm's law

$V = I\ R$

$I = \frac{V}{R}$

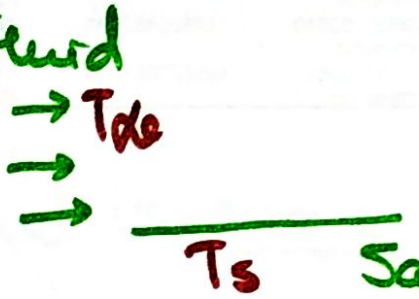
Thermal Circuit

Conduction



$$q = \frac{kA}{L}(T_1 - T_2)$$

Convection



$$q = hA(T_s - T_\infty)$$

$$q = \frac{(T_1 - T_2)}{L/kA}$$

$R_{thcon.}$

$$q = \frac{(T_s - T_\infty)}{1/hA}$$

$R_{conv.}$

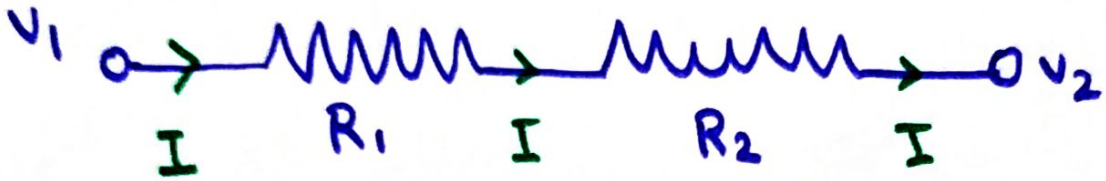
Similarity

$I \rightarrow q$ (Current → heat)

$V \rightarrow$ Temp. (Voltage → Temp. Diff.)

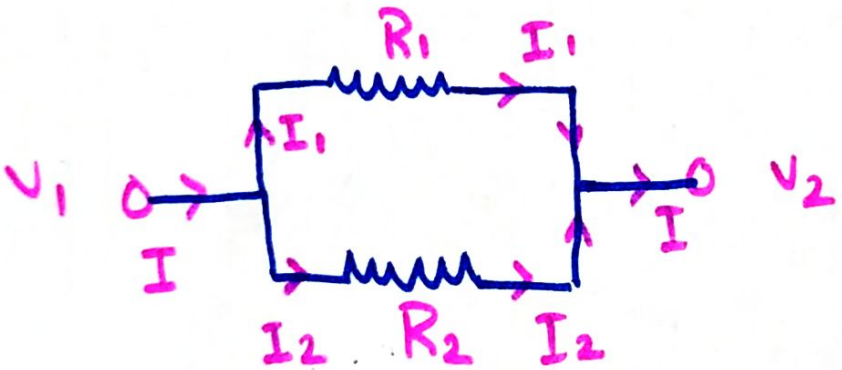
$R_{elec} \rightarrow R_{therm}$

★ Series Connection

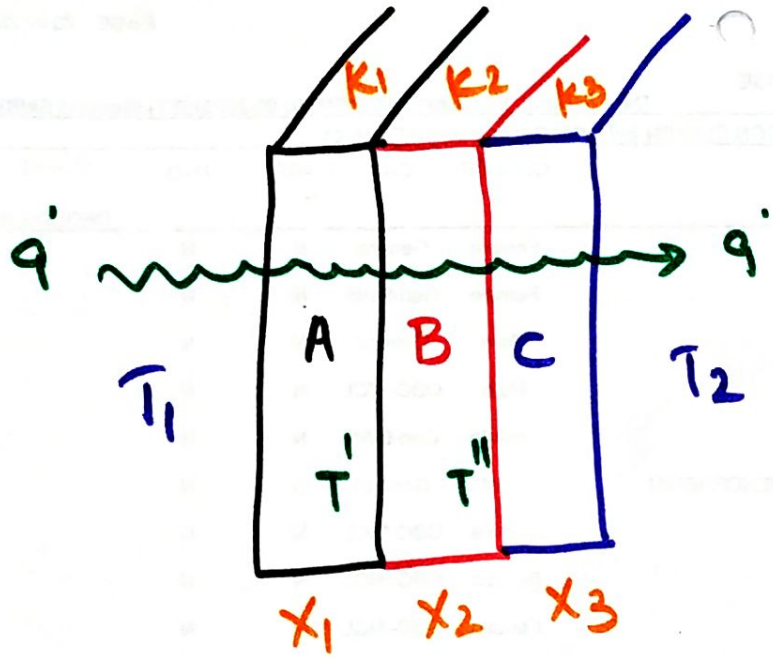


Current flow Through All Resistance is <u>same</u>

★ Parallel Connection



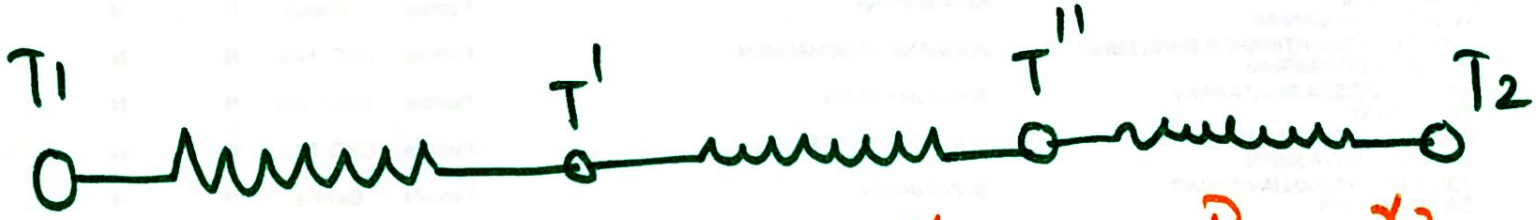
Current flow Through Resistance is <u>Different</u>



$$R_{th\,cond} = \frac{L}{Ak}$$

$$R_1 = \frac{X_1}{Ak_1} \qquad R_3 = \frac{X_3}{Ak_3}$$

$$R_2 = \frac{X_2}{Ak_2}$$



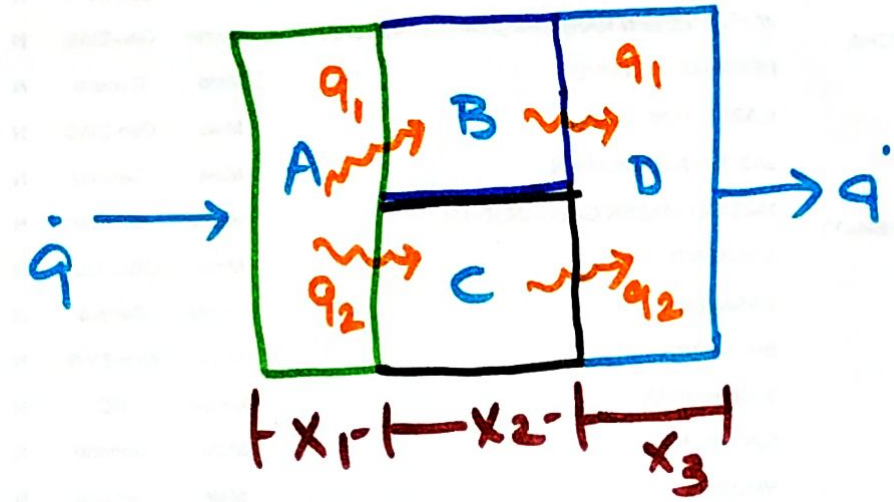
$$R_1 = \frac{X_1}{Ak_1} \qquad R_2 = \frac{X_2}{Ak_2} \qquad R_3 = \frac{X_3}{Ak_3}$$

$$R_{tot} = R_1 + R_2 + R_3$$

$$R_{tot} = \frac{X_1}{Ak_1} + \frac{X_2}{Ak_2} + \frac{X_3}{Ak_3}$$

$$\dot{q} = \frac{T_1 - T_2}{R_{tot}}$$

Parallel connection.

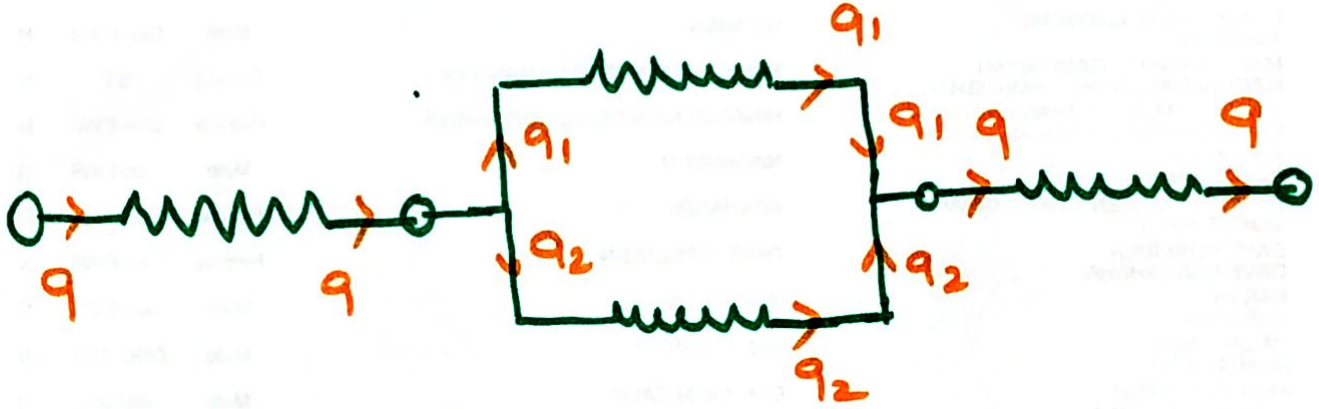


$$R_A = \frac{X_1}{A_A K_1} \qquad A_A = A_D = A_B + A_C$$

$$A_A \neq A_B$$

$$R_B = \frac{X_2}{A_B K_2}$$

$$R_C = \frac{X_3}{A_C K_3} \qquad R_D = \frac{X_3}{A_D K_4}$$



$$\frac{1}{R_{eq}} = \frac{1}{R_B} + \frac{1}{R_C}$$

$$q = q_1 + q_2$$

$$R_{tot} = R_1 + R_{eq} + R_3 \qquad q = \frac{T_1 - T_2}{R_{total}}$$