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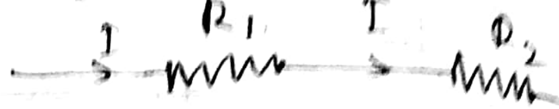
GROUPING OF RESISTANCE

1. Series connection:

If same current flows through different resistance, then they are said to be connected in series. The figure represents the series connection of resistances. For two resistance in series, we have,

$$R_s = R_1 + R_2$$



Clearly,

$R_s > R_1$; and also

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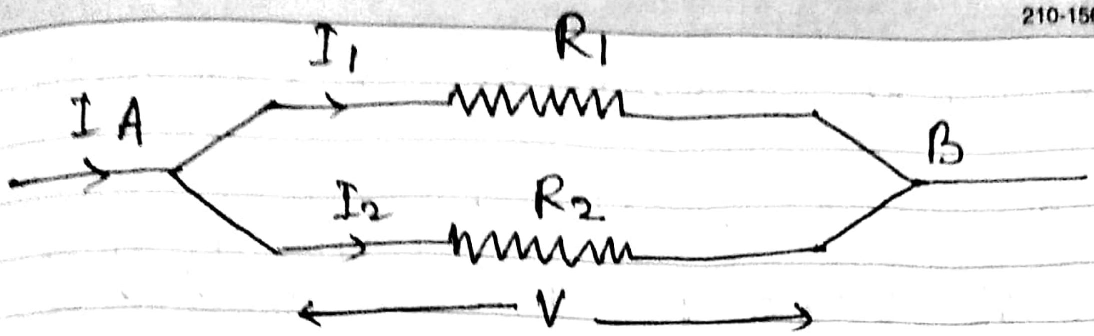
$R_s > R_2$. As a matter of fact the equivalent resistance in series connection is equal to the sum of the individual resistances.

Also, due to series connection of resistances, the conductance, current and the load on the cell (if the voltage supply is constant) will decrease, whereas resistance of the circuit will increase.

2) Parallel Connection:

Figure below represents parallel connection of two resistances. Resistance are said to be in parallel to each other if same P.D exists across them. For two resistence in parallel, we have,



$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$$

or, $$R_p = \frac{R_1 R_2}{R_1 + R_2}$$

In this case clearly $R_p < R_1$ and also $R_p < R_2$. Therefore, when the resistance are connected in parallel then conductance, current and the load on the cell (if voltage supply is constant) increases whereas the resistance of the circuit decreases.

Also, we have,

$$V_A - V_B = I_1 R_1 = I_2 R_2$$

$$\therefore \frac{I_2}{I_1} = \frac{R_1}{R_2}$$

It can also be proved that

$$I_1 = \frac{R_2}{R_1 + R_2} I \text{ ; and}$$

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