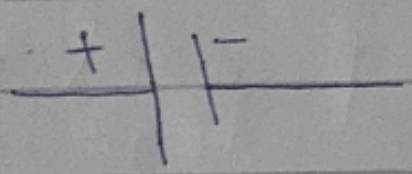
Cell:-

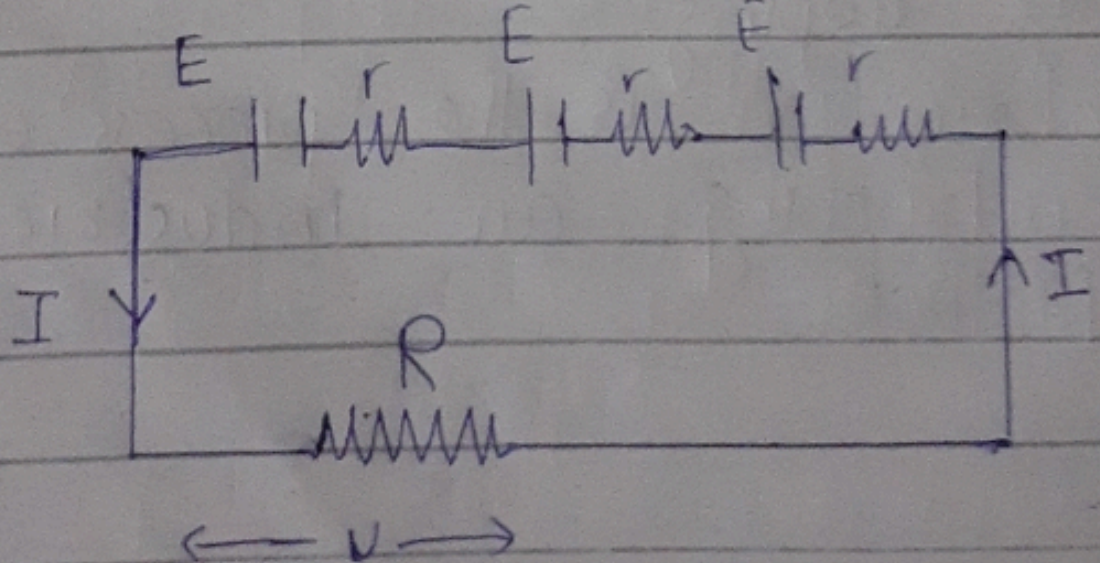
"A cell is a device that use chemical energy to generate electricity and maintain the flow of charge in circuit."

Symbole:-



Cell in Series

→ cell are connected in series when the cell are connected end to end.



→ The current I is flow ~~from~~ and Resistor is connected with series cell.

→ In series combination, the current is same & voltage is divide.

→ The emf of the battery is the sum of individual emf.

$$E_{eq} = nE$$

→ The total internal resistance of the battery is the sum of individual internal resistance.

$$r_{eq} = nr$$

→ The total Resistance of the circuit is:

$$R_{eq} = R + nr$$

(i) if $R \ll nr$

then $I = \frac{E}{r}$

$$I = \frac{nE}{R + n\gamma}$$

$$I = \frac{\cancel{n}E}{\cancel{n}\gamma} = \frac{E}{\gamma}$$

when the external Resistance is negligiable in comparsion, the cell are connected in series to get the minimum current.

(ii) if $nr \ll R$

Then $I = n\left(\frac{E}{r}\right)$

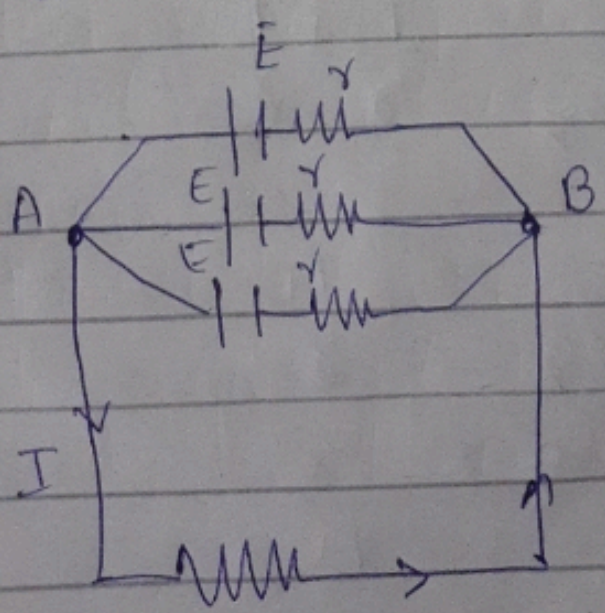
$$I = \frac{nE}{R + n\gamma}$$

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

When internal resistance is negligible in a comparison, the cell in series get a maximum current.

Combination of Parallel Cell

→ In parallel combination, the cell are connected through point.



→ In parallel combination the voltage is same and current is divide

→ The total emf of the battery is same as the emf of single cell.

$$E_{eq} = E$$

→ The total internal resistance of the battery is equal to the sum of the reciprocal of individual of internal resistance.

$$\frac{1}{r_{eq}} = \frac{1}{r} + \frac{1}{r} \cdots$$

$$\frac{1}{req} = \frac{n}{r}$$

$$req = \frac{r}{n}$$

→ The total Resistance of the circuit is:

$$R_{eq} = \frac{r}{n} + R$$

(i)

if $R << \frac{r}{n}$ then

$$I = n(E/r)$$

$$I = \frac{E}{R + \frac{r}{n}} = \frac{E}{\frac{r}{n}} = \frac{nE}{r}$$

when the external resistance is negligible, the current is maximum.

(ii)

if $R >> \frac{r}{n}$ then

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

when the internal resistance is negaligabl, the current is minum.

$$I = \frac{E}{R + \frac{r}{n}} = \frac{E}{R}$$

$\frac{r}{n} \Rightarrow$ neglagiable