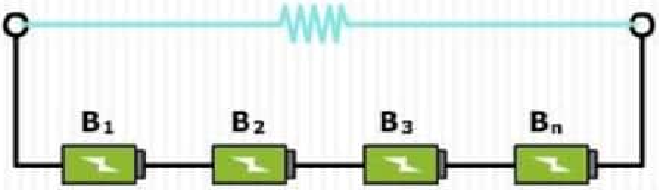
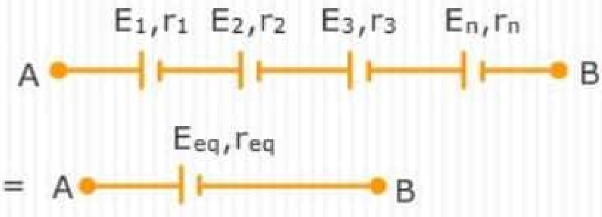
GROUPING OF CELLS

1 CELLS IN SERIES





Equivalent EMF

$E_{eq} = E_1 + E_2 + \ldots\ldots + E_n$

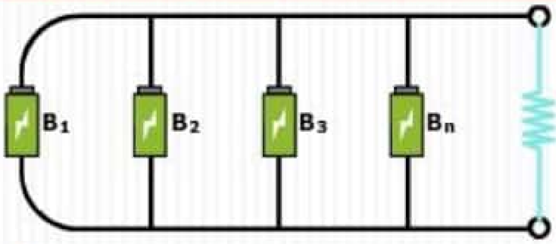
Equivalent internal resistance

$r_{eq} = r_1 + r_2 + r_3 + r_4 + \ldots\ldots r_n$

In n cells each of emf E are arranged in series and if r is internal resistance of each cell, then the total emf is equal to nE

and, current in the circuit, $I = \frac{nE}{R + nr}$

2 CELLS IN PARALLEL



$E_{eq} = \frac{E_1/r_1 + E_2/E_2 + \ldots\ldots E_n/r_n}{1/r_1 + 1/r_2 + \ldots\ldots + 1/r_n}$

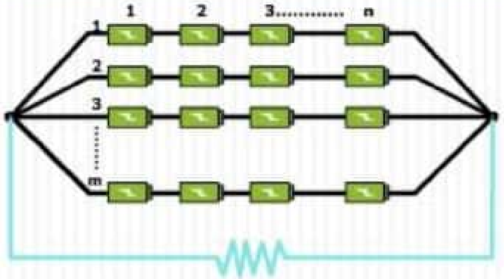
$\frac{1}{r_{eq}} = \frac{1}{r_1} + \frac{1}{r_2} + \ldots\ldots + \frac{1}{r_n}$

If m cells, each of emf E and internal resistance r be connected in parallel and if this combination is connected to an external resistance (R) then the emf of the circuit = E.

internal resistance of the circuit = $\frac{r}{m}$

and $I = \frac{E}{R + \frac{r}{m}} = \frac{mE}{mR + r}$

3 CELLS IN MULTIPLE ARC



n = number of rows

m = number of cells in each row

Current $I = \frac{mE}{R + \frac{mr}{n}}$

for maximum current $nR = mr$

4 ELECTRICAL POWER

Power, $P = \frac{V.dq}{dt} = VI = I^2 R = \frac{V^2}{R}$

Work, $W = VIt = I^2 Rt = \frac{V^2}{R} t$

Heat, $H = I^2 Rt$ Joule $= \frac{I^2Rt}{4.2}$ calorie