

# PHYSICS

## Formulas in current electricity (Direct Current)

1	Electric Current	$i = q/t$	"q" is charge passing in normal direction through a cross section of conductor in time "t"
2	Drift velocity $V_d$ with Electric field	$V_d = \frac{eE\tau}{m}$	e is charge and m is mass on electron, E is electric field, $\tau$ is relaxation time.
3	Current I with Drift velocity $V_d$	$I = n e A V_d$	n is number density with of free electrons, A is area of cross section.
4	Mobility of charge " $\mu$ "	$\mu = V_d / E = \frac{e\tau}{m}$	
5	Mobility and drift velocity	$V_d = \mu_e E$	
6	Current and Mobility	$I = A n e \mu_e E$	
7	Resistance, P.D., and Current	$R = V / I$	V Potential Difference, I Current .
8	Resistance R with specific Res.	$R = \frac{l}{A}$	l is length of conductor and A is area of cross section
9	Specific Resistance, $\rho$	$\rho = R \frac{l}{A}$	
10	Resistivity with electrons	$\rho = \frac{m}{n e^2 \tau}$	
11	Current density J	$J = I / A$	I is current, J current density, A is area of cross section
12	Current density magnitude	$J \cos\theta = I / A$	$\theta$ is angle between and
13	Conductance G	$G = 1/R$	
14	Conductivity		is specific resistance
15	Microscopic form of Ohms Law	$J = \sigma E$	E is electric field
16	Temperature coefficient of Resistance	$\alpha = \frac{R_t - R_0}{R_0 (t - t_0)}$	$R_0$ is resistance at $0^\circ$ C. $R_t$ is resistance at $t^\circ$ and " $t$ " is temperature difference.
17	Resistances in series	$R = R_1 + R_2 + R_3$	Same current through all resistances (circuit Current
	Resistances in parallel	$1/R_e = 1/R_1 + 1/R_2 + 1/R_3$	Same P.D. across each resistance (V of cell)
18	In a cell, emf and internal resistance	$I = \frac{E}{R + r}$	I is current, E is emf, R is external resistance, r is internal resistance.
19	In a circuit with a cell	$V = E - Ir$	V is terminal potential difference
20	n Cells of emf E in series	Emf = nE	
21	Resistance of n cells in series	nr + R	r is internal resistance of one cell, R external Resistance
22	Current in circuit with n cells in series	$I = \frac{nE}{nr + R}$	r is internal resistance of one cell, R external Resistance
23	n cells in parallel, then emf	emf = E	
24	n cells in parallel, resistance	$R + r/n$	R external resistance, r internal resistance
25	Cells in mixed group, condition for maximum current	$R = nr$	n is number of cells in one row, m is number of rows. r is internal resistance, R external resis.
26	Internal resistance of a cell	$r = \frac{E - V}{I}$	E is emf, V is terminal Potential difference, R is external resistance.
27	Power of a circuit	$P = I.V = I^2 R = V^2 / R$	
28	Energy consumed	$E = I.V.\Delta T$	$\Delta T$ is time duration
29	Kirchoff Law (junction rule)		Sum of currents at junction is zero.
30	Kirchoff Law (Loop rule)		In a loop sum of all p.d.s is Zero