By Abhay Sir

# Electricity (विधुत)

## Charge (आवेश)

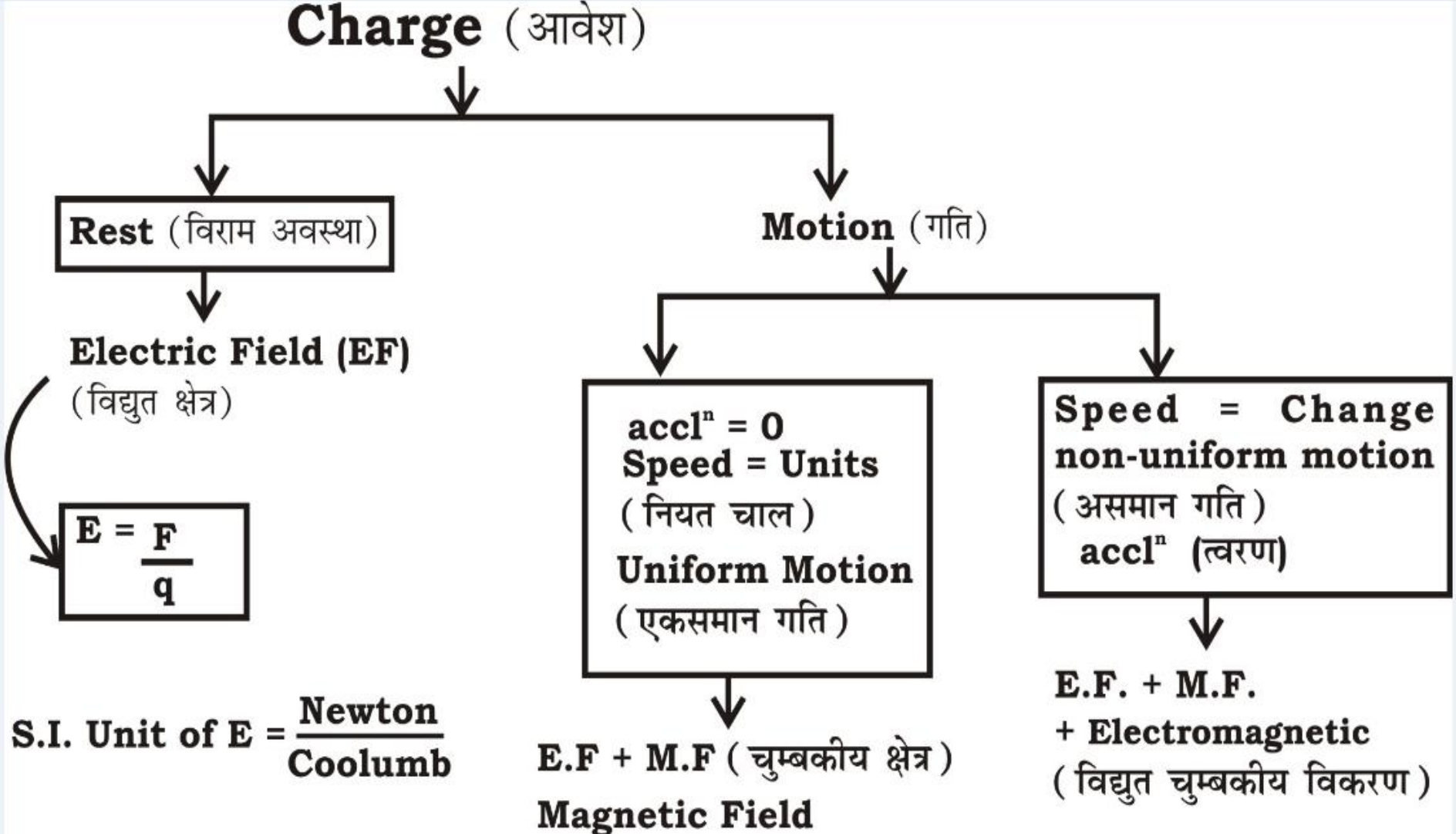
- $e = -1.6 \times 10^{-19}$ C

  $P = +1.6 \times 10^{-19}$ C

  $n = 0$

1 coulomb = $6.25 \times 10^{18}$ Electron

- S.I Unit = Coulomb (कूलम्ब) (C)


Charge (आवेश)
Rest (विराम अवस्था)
Motion (गति)
Electric Field (EF)
(विद्युत क्षेत्र)
E = F/q
accl^n = 0
Speed = Units
(नियत चाल)
Uniform Motion
(एकसमान गति)
Speed = Change
non-uniform motion
(असमान गति)
accl^n (त्वरण)
S.I. Unit of E = Newton/Coolumb
E.F + M.F (चुम्बकीय क्षेत्र)
Magnetic Field
E.F. + M.F.
+ Electromagnetic
(विद्युत चुम्बकीय विकरण)

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# Electric Current (विधुत धारा)

## Rate of flow of charge (आवेश के प्रवाह की दर)

$$I = \frac{Q}{t}$$

$$1\ \text{Ampere} = \frac{1\ \text{Coulomb}}{1\ \text{sec}}$$

- S.I unit Ampire
- Scalar (अदिश)
- Measured by = Galvanometre or Ametre
- (R= o)

## दिष्ट धारा

## (Direct current)

Same direction

e.g. Battery

## प्रत्यावर्ती धारा

## (Alternate current)

Direction change

after fix time interval

India - Frequency (आवृत्ति )

= 50 Hz

Voltage - 220 volt

Note-

(1) DC to AC = Inverter

(2) DC = heat loss more ( उष्मा का क्षय ज्यादा )

AC = heat loss less ( उष्मा का क्षय कम )

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# Potential Difference (विभवांतर) (V)

**Work done required to carry unit positive charge from one point to another point is known as potential difference.**

**ईकाई धन आवेश को एक बिन्दू से दूसरे बिंदू तक ले जाने में किया गया कार्य विभवांतर कहलाता है।**

$$V = \frac{W}{q}$$

$$1\ \text{Volt} = \frac{1\ \text{Joule}}{1\ \text{Coulomb}}$$

- S.I Unit = Volt
- Measure by = voltmeter

(R = Infinity)

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# Ohm's Law

$V \propto I$

V = Potential difference (विभवांतर)

I = Current (धारा)

Temp = Cons$^{t}$ → Drawback

**Note:-**

(1) i → high to low potential (उच्च से निम्न विभव)

(2) Electrons → low to high potential (निम्न से उच्च विभव)

$V \propto I$

$V = RI$

$R = Cons^t$

Resistance (प्रतिरोध)

S.I unit = ohm ($\Omega$)

1 Volt = 1 ohm × 1 Ampere

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# V – I Graph

**Slope of V–I Graph gives Resistance**

**(V–I आरेख का slope प्रतिरोध बताता है।)**

**#Ohmic conductor= straight line= follow Ohms law**

**#Non ohmic conductor=curved line = doesn't follow ohms law**

Find relation bet$^{n}$ $R_1$ and $R_2$

(a) $R_1 = R_2$

(b) $R_1 > R_2$

(c) $R_1 < R_3$

(d) NOTA

# Short Circuit ( लघु पथन )

- Resistance of wire ( तार का प्रतिरोध ) R = 0
- By ohm's law

  Current = Infinity ( अनंत )

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# Dependency of Resistance
## प्रतिरोध की निर्भरता

$$R = \frac{\rho l}{A}$$

(1) Temprature = Resistance (प्रतिरोध)

(2) l = length of wire

(3) A = Area of crossection
( अनुप्रस्थ काट का क्षेत्रफल )

(4) ρ = Resisteivity (गतिरोधकता)

Nature of Material

(1) S-I unit of $\rho$ = ohm metre

(2) Conductivity = $\frac{1}{\text{Resistivity ( प्रतिरोधकता )}}$

S.I. unit = $\frac{1}{\text{ohm metre}} = \Omega^{-1} m^{-1}$

**Note: It volume ( आयतन ) is const.**

$$\frac{R_1}{R_2} = \left(\frac{l_1}{l_2}\right)^2 = \left(\frac{r_2}{r_1}\right)^4 = \left(\frac{A_2}{A_1}\right)^4$$

## Old NEW

| | Old | New |
|---|---|---|
| Resistance प्रतिरोध | R1 | R2 |
| Length | L1 | L2 |
| Radius (त्रिज्या) | R1 | R2 |
| Area (क्षेत्रफल) | A1 | A2 |

# Joule's Law

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## Heating Effect ( उष्मीय प्रभाव )

$$H = I^2 Rt$$

H = Heat ( उष्मा )

I = Current ( धारा )

R = Resistance ( प्रतिरोध )

t = time ( समय )

## Application

(1) Electric Bulb= filament =tungusten

(2) Electric Iron= Nichrome wire

(3) Electric Heater= Nichrome wire

(4) Electric Fuse=

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# Electric Power (P) ( विद्युत शक्ति )

**Rate of consumption of heat**

**( उष्मा के क्षय की दर )**

$$P = \frac{H}{t}$$

**(1)** $P = i^2R$ **(2)** $P = \frac{V^2}{R}$ **(3)** $P = VI$

**Note:-**

≅ **S.I. unit of P = watt**

≅ **1 HP = 746 watt**

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# Combination of Resistance
## ( प्रतिरोध का संयोजन )

### Series ( श्रेणीक्रम )

$$\text{Req.} = R_1 + R_2 + R_3 + \ldots\ldots$$
( विद्युत क्षेत्र )

→ Current = Same
धारा = एक जैसा
→ Voltage = Change

$\text{Req} = n \times R$

use – Galvanometer + Ameter

### Parallel ( समांतर )

$$\frac{1}{R_{eq}} = \frac{1}{R_1} = \frac{1}{R_2} + \frac{1}{R_3}$$

→ Voltage = Same
विभवांतर = एक जैसा
→ Current = Change

$$\text{Req} = \frac{R}{n}$$

use - Houshold, Voltmeter

≅ 1 watt = $\frac{1 \text{ joule}}{1 \text{ sec}}$

≅ less Resistance = More power = more bright

ज्यादा शक्ति = ज्यादा चमकीला = कम प्रतिरोध

(If voltage ( विभवांतर ) const.

LIVE

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# Commercial unit of energy ( ऊर्जा का व्यवयायिक क्षात्रक )

**1 Unit = 1 kwh = $3.6 \times 10^6$ Joule**

**Kwh = Killo watt hour = commercial units energy**

**Joule = S.I. unit of energy**