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ELECTRICAL ENGINEERING

Electrical

Hand Notes For GATE, IES, PSUs etc…

Hand Notes

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Note : *We also providing IIT JEE, Advance, NEEt, JEE UG, GATE, IES, PSUs & Competitive Exam Materials [Handnotes, Shortnotes & Books], All Reports [Seminar Reports & PPT]*

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Cover Topic :

- Electric Circuits &Network
- Basic Concept Of Nature Of Electricity
- Classification Of Resistance
- Conversion Of Current Source To Voltage Source
- Oms Law
- Kirchoffs Current Or Voltage Law
- Node Analysis
- Mesh Analysis
- Superposition Theroam
- Thevenins Theroam
- Nortons Theroam
- Ac Circuits
- Three Phase Circuits
- Transformer

Basic Terms Related to Electrical Circuits & Networks

① **Current** :- (I). — unit → Ampere (A).

flow of electron's. or | rate of change of charge w.r.to time |

$$I = \frac{dq}{d} = \frac{q}{t}$$

Also $I = \frac{V}{R}$ V = Voltage, R = Resistance

② **Electrical Potential** :— (V) → volts. or Joules/coulomb (J/C).

Def^n :- work done per unit charge or electrical potential energy per unit charge.

Joules/Coulomb is Nothing but Volt.

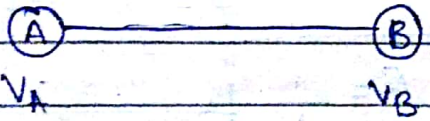
$$V = \frac{W}{Q}$$ Also, $V = I \cdot R$

Note :- Electrical potential is same as voltage.

③ **potential Difference** :— (V_{AB}) ← i.e bet^n two points.

Its unit is volt.

Def^n :- The diff. in the potential of two charged bodies.



$V_{AB} = V_A - V_B$

④ EMF (Electromotive force) :— (E) unit is volt

Def^n :- The electrical force that moves electrical charges in a conductor and produce electric current

⑤ Resistance :— (R) Unit → ohm (Ω)

① opposition to the flow of current.
② opposition to flow ~~fto~~ of electron.
③ Rate of change of voltage with respect to current

$$R = \frac{V}{I}$$ volt/ampre. (ohm(Ω))

$$R = \rho \left(\frac{l}{a}\right)$$

ρ → resistivity.

⑥ Resistivity :— (specific resistance → ρ).

it is Resistance when current flow's through 1m length & $1m^2$ c/s. area.

$$\rho = \frac{R \cdot a}{l}$$

$$\rho \Rightarrow \Omega m.$$

Simply, it is the resistance of material of unit length having unit c/s. Area.

⑦ Conductance :— (G). ⇒ Reciprocal of resistance.

$$G = \frac{1}{R}$$ Ω^{-1} or $\frac{1}{\Omega}$ or Siemens.

$$G = \frac{1}{R}$$

⑧ Conductivity ⇒ Reciprocal of resistivity (ρ). siemens/mtr. mho/mtr.

$$G = \frac{1}{R} = \frac{q}{S \cdot t}$$

$$\Rightarrow \frac{m^2}{\Omega \cdot m}$$

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(9) Electrical energy (work) ↔ unit is 'Joule' (J).

loss of electrical potential energy in maintaining current in a circuit.

or The work done (Electrical work) to transfer charge from one point to another point.

It is denoted by 'W'

We know, $V = \frac{W}{Q}$

So Electrical energy (work),

$$W = V \cdot Q$$

$$W = V \cdot I \cdot t \quad \because (q = I \cdot t)$$

$$W = P \times t \quad \because \text{Power} = V \cdot I$$

$$W = I^2 \cdot R \cdot t$$

$$W = \frac{V^2}{R} \cdot t$$

(10) Electrical power :—

It is rate of doing Electrical work.

It's unit is watt.

$$P = V \cdot I$$