

COM 223: Crash Note on Basic Electrical Concepts

1. Ohm's Law: $V = I \times R$

- V: Voltage (Volts) | I: Current (Amps) | R: Resistance (Ohms)
- More resistance = less current.

2. Kirchhoff's Laws:

- KCL: Total current into a node = Total current out.
- KVL: Sum of all voltages in a closed loop = 0.

3. Current Divider Rule (Parallel Resistors):

- $I_1 = I_{\text{total}} \times (R_2 / (R_1 + R_2))$
- Smaller resistance gets more current.

4. Voltage Divider Rule (Series Resistors):

- $V_1 = V_{\text{total}} \times (R_1 / (R_1 + R_2))$
- Larger resistance gets more voltage.

5. Resistors:

- Oppose current. Unit: Ohms (Ohms).
- Series: Add values | Parallel: $1/R_t = 1/R_1 + 1/R_2 + \dots$

6. Transistors (NPN/PNP):

- Terminals: Base (B), Collector (C), Emitter (E).
- Small current at Base controls large current from C to E.

7. Power Formula: $P = V \times I$ (Watts)

8. Diode: Allows current in only one direction.

9. Capacitor: Stores energy in electric field.

10. AC vs DC:

- AC: Alternates direction (home supply).
- DC: Flows in one direction (batteries).