Three-phase Circuits – Part 1

STUDY FOR FE

Three-Phase Circuits : A system used for power generation, transmission, and distribution involving at least three conductors.

- **Balanced 3-Phase Systems:**
  - Current/Voltage in each phase is 120° apart.
  - Equal load across phases.
- **Benefits:**
  - Doubles power transmission efficiency.
  - Reduces vibration through constant torque.
  - Less material used for the same power rating.
  - Easier starting than single-phase machines.
- **System Types:**
  - Y-Network
  - Delta-Network
- **Common Voltages:**
  - **Transmission:** 115 kV, 230 kV, 500 kV
  - **Distribution:** 15 kV, 5 kV, 480 V

Wye-Network:

- **Configuration:** Three voltage sources connected to a neutral point.
- **Load Connection:** Can be connected using 3 or 4 wires.
- **Equations:** $V_L = \sqrt{3}V_P = \sqrt{3}V_{LN}$ $\quad I_L = I_P$
- **Phase Relationship:** Line voltage leads phase voltage by 30°.