# Essential Electrical & Electronic Engineering

**Common to all branches** **L-T-P-C**
**3-1-3-5.5**

## UNIT – I: DC & AC Circuits

Electrical circuit elements (R - L and C) - Kirchhoff laws - Series and parallel connection of resistances with DC excitation. Nodal and loop analysis. Thevenin's and Superposition Theorems

Representation of sinusoidal waveforms - peak and rms values - phasor representation - real power - reactive power - apparent power - power factor - Analysis of single-phase ac circuits consisting of RL - RC - RLC series circuits. Series Resonance and band width.

## UNIT-II: Poly phase & Magnetic circuits

Generation of 3-phase voltages - phase sequence - star & delta connections - voltage, current & power in star & delta connected systems - analysis of 3-phase balanced circuits - measurement of 3-phase power by 2 wattmeter method.

Faraday's Laws of Electromagnetic Induction .Dynamically induced EMF – Statically induced EMF – Self Inductance – Mutual Inductance - Coefficient of coupling –Inductances in Series – Inductances in parallel – Dot convention.

## UNIT-III: DC Machines

Principle and operation of DC Generator - EMF equation - OCC characteristics of DC generator – Principle and operation of DC Motor – Performance Characteristics of DC Motors - Speed control of DC Motors.

## UNIT-IV: AC Machines:

Principle and operation of Single Phase Transformer - EMF equations-losses in transformers, regulation and efficiency. OC and SC test on transformer – auto transformer.

Principle, operation and construction of Three phase Induction Motor –torque equation and torque slip characteristics-power losses and efficiency.

## UNIT-V: Semiconductor Devices:

Characteristics of Semiconductor junction Diode, Zener diode, transistor, JFET, UJT, SCR and their applications. Half-wave, Full-wave rectifiers and Bridge rectifier, with (L and LC) and without filters.

Bipolar Junction Transistor: Transistor operation, Common base configuration, Common emitterconfiguration, Transistor amplifying action, Common collector configuration, Operating point

**Text Books:**


1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
2. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.


**References:**


1. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.