Basic Electrical Engineering   2-0-0

For 1ˢᵗ Semester Code (RBE1B001)

Module 1:

DC & AC Circuits (6 hours)

Circuit laws: Fundamentals of electrical circuit, Ohm's law, Kirchoff's laws, series and parallel connections, analysis of circuits using Node voltage, mesh current, superposition, Thevenin and Norton Theorems to solve simple circuits with dc excitation. Single phase circuit: Single phase emf generation, Representation of sinusoidal waveforms, average, effective, peak and rms values, j operator, Rectangular and polar representation of phasors, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel).

Module 2:

Three Phase Circuits (5 hours)

Three phase circuit: Three phase emf generation, Delta-star and star-delta conversions, voltage and current relations in star and delta connections. solution of the three phase circuits with balanced voltage and balanced load conditions, phasor diagram, measurement of power in three phase circuits.

Module 3:

Magnetic Circuits (5 hours)

Magnetic Circuits: MMF, flux, reluctance, inductance. Review of Ampere Law, Biot Savart Law. Magnetic field, BH characteristics and Hysteresis loss, Series and parallel magnetic circuits.

Module 4:

Electrical Machines (6 hours)

Transformers (Single Phase): Construction, operation, Phasor diagram and performance testing. Induction Motors (Three Phase): Basic Principles, Rotating Magnetic Field, Equivalent circuit, Phasor diagram, Torque-Speed Characteristics Basics of DC machines: EMF Equation, Torque Equation, Methods of Excitation

Text / References:

1. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010
2. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford UniversityPress, 2011.
3. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.
4. D.C.Kulshreshtha,"BasicElectricalEngineering",McGrawHill,2009.