

## **BASIC ELECTRICAL ENGINEERING**

**Course Code: ECE 101****Credit Units: 03****Total Hours: 30****Course Objective:**

The objective of the course is to provide a brief knowledge of Electrical Engineering to students of all disciplines. This Course includes some theorems related to electrical, some law's related to flow of current, voltages, basic knowledge of Transformer, basic knowledge of electromagnetism, basic knowledge of electrical network.

**Course Contents:****Module I: DC Circuits: (7 hours)**

Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff's current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin's and Norton's Theorems. Time-domain analysis of first-order RL and RC circuits.

**Module II: AC Circuits: (7 hours)**

Representation of sinusoidal waveforms, peak and R.M.S. values, phasor representation, 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), resonance. Three- phase balanced circuits, voltage and current relations in star and delta connections.

**Module III: Transformers: (6 hours)**

Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

**Module IV: Electrical Machines: (6 hours)**

Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.

**Module V: Power Converters: (4 hours)**

DC-DC buck and boost converters, duty ratio control. Single-phase and three-phase voltage source inverters; sinusoidal modulation.

**Course Outcomes:**

- To understand and analyze basic electric and magnetic circuits.
- To study the working principles of electrical machines and power converters.
- To introduce the components of low voltage electrical installations.

**Examination Scheme:**

| Components    | A | CT | S/V/Q/HA | EE |
|---------------|---|----|----------|----|
| Weightage (%) | 5 | 15 | 10       | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

**Text & References:**

- D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
- D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
- L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
- E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
- V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.