Course Syllabi: UEE001: Electrical Engineering (L : T : P :: 3 : 1 : 2)

1. **Course number and name**: UEE001; Electrical Engineering

2. **Credits and contact hours**: 4.5 and 6

3. **Text book, title, author, and year**

Text Books / Reference Books

- *Hughes, E., Smith, I.M., Hiley, J. and Brown, K., Electrical and Electronic Technology, PHI (2008).*
- *Nagrath, I.J. and Kothari, D.P., Basic Electrical Engineering, Tata McGraw Hill (2002).*
- *Naidu, M.S. and Kamashaiah, S., Introduction to Electrical Engineering, Tata McGraw Hill (2007).*
- *Chakraborti, A., Basic Electrical Engineering, Tata McGraw–Hill (2008).*
- *Del Toro, V., Electrical Engineering Fundamentals, Prentice–Hall of India Private Limited (2004)*

a. Other supplemental materials

- Nil

4. **Specific course information**

a. Brief description of the content of the course (catalog description)

DC Circuits: Kirchhoff's Voltage and Current Laws; Power Dissipation; Voltage Source and Current Source; Mesh and Nodal Analysis; Star-Delta Transformation; Superposition Theorem; Thevenin's Theorem; Norton's Theorem; Maximum Power Transfer Theorem; Millman's Theorem and Reciprocity Theorem; Transient Response of Series RL and RC Circuits.

Steady state analysis of DC Circuits: The Ideal Capacitor, Permittivity; The Multi-Plate Capacitor, Variable Capacitor; Capacitor Charging and Discharging, Current-Voltage Relationship, Time-Constant, Rise-Time, Fall-Time; Inductor Energisation and De-Energisation, Inductance Current-Voltage Relationship, Time-Constant; Transient Response of RL, RC and RLC Circuits.

AC Circuits: Sinusoidal sources, RC, RL and RLC circuits, Concept of Phasors, Phasor representation of circuit elements, Complex notation representation, Single phase AC Series and parallel circuits, Power dissipation in AC circuits, Power factor correction, Resonance in Series and Parallel circuits, Balanced and unbalanced 3-phase circuit - voltage, current and power relations, 3-phase power measurement, Comparison of single phase and three phase supply systems.

Electromagnetism: Electromagnetic induction, Dot convention, Equivalent inductance, Analysis of Magnetic circuits, AC excitation of magnetic circuit, Iron losses, Fringing and stacking applications: solenoids and relays.

Single Phase Transformers: Constructional features of transformer, operating principle and applications, equivalent circuit, phasor analysis and calculation of performance indices.

Motors and Generators: DC motor operating principle, construction, energy transfer, speed-torque relationship, conversion efficiency, applications, DC generator operating principle, reversal of energy transfer, emf and speed relationship, applications.

Laboratory Work: Network laws and theorems, Measurement of R,L,C parameters, A.C. series and parallel circuits, Measurement of power in 3 phase circuits, Reactance calculation of variable reactance choke coil, Open circuit and Short circuit tests on single phase transformer, Starting of rotating machines.

5. Specific goals for the course

After the completion of the course, the students will be able to:

- Apply networks laws and theorems to solve electric circuits.
- Analyze transient and steady state response of DC circuits.
- Signify AC quantities through phasor and compute AC system behaviour during steady state.
- Explain and analyse the behaviour of transformer.
- Elucidate the principle and characteristics of DC motor and DC generator**.**

6. Brief list of topics to be covered

- DC Network
- DC Tansients
- AC Circuits
- Electromagnetism
- Single Phase Transformers
- DC Motors and Generators