EE1501 Elements of Electrical Engineering**L-T-P- 3-0-0, Cr: 03**

### **Objectives: The course is one of the foundation courses for B. Tech students, where they will learn basics of DC and AC circuit analysis, laws of electrical circuit analysis, and fundamentals of Electrical machines.**

### **Prerequisites: Mathematics and Physics of 12th level.**

### **Outcome: After completion of the course, students shall be able to understand and analyze DC and AC Circuits, phasor diagrams of AC circuits, magnetic circuits for electrical machines, fundamentals of single phase Transformer and rotating machines.**

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| Unit 1. | Introduction: Steady state analysis of D.C. circuits with independent and dependent sources, Kirchhoff’s Laws, Mesh Analysis and nodal analysis, Series and parallel circuits, Current divider rules, voltage divider rules, star delta conversion, Superposition theorem, Thevenin’s theorem, Norton’s theorem, Maximum Power Transfer Theorem | **13 Lectures** |
| Unit 2. | Single phase A.C. circuits : Impedance of series and parallel circuits, Phasor diagram, Power, Power factor, Power Triangle, Resonance and Q-factor | **5 Lectures**  |
| Unit 3. | Three phase A.C. circuits: Star delta, line and phase relations, Power relations, Analysis of balanced and unbalanced 3-phase circuits, Introduction to three phase induction motor  | **7 Lectures** |
| Unit 4. | Magnetic circuits: Introduction, Series & Parallel magnetic circuits | **3 Lectures** |
| Unit 5. | Single Phase Transformer: Types, construction, operating principle, EMF equations, Turns ratio, Equivalent circuits, losses and efficiency.  | **3 Lectures** |
| Unit 6. | Introduction to DC Machines: Principles of operation, constructions, classifications, and analysis | **3 Lectures** |
| Unit 7. | Measuring Instruments classification of instruments, Classification of Secondary instruments, Measurements of Voltage current Power and energy | **4 Lectures** |
| Unit 8. | House wiring & safety: Single phase and three phase system – phase, neutral and earth, basic house wring - tools and components, different types of wiring – staircase, florescent lamp and ceiling fan, Earthing and Lightening arrestor, Different type of earthing system, plate and pipe earthing, protection of wiring system, Fuse, MCB, MCCB and ELCB | **4 Lectures** |

**Text Books**

1. Hughes revised by Mckenzie Smith with John Hilcy and Keith Brown, ‘Electrical and Electronics Technology’, 8th Edition, Pearson, 2012.
2. A. Bruce Carlson, Circuits, Thomson Books, 2006
3. Electrical wiring by uttpal
4. Fundaments of Electrical Engineering by Rajendra Prasad
5. A K Sawhney, Course in Electrical & Electronic Measurement & Instrumentation, Dhanpat Rai & Sons.