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| **B. TECH 1st SEMESTER** | **L** | **T** | **P** | **C** |
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| **19EE2T01: BASIC ELECTRICAL ENGINEERING** | | | | |

**COURSE OUTCOMES: *After successful completion of this course, students should be able to:***

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| --- | --- | --- |
| CO1 | : | Solve simple DC circuit using KVL, KCL and Network Theorems. |
| CO2 | : | Understand the fundamental concepts of single-phase and three phase systems analysis for simple AC circuit. |
| CO3 | : | Demonstrate the construction, working principles and operating characteristics of DC machines, transformer and AC rotating machines. |
| CO4 | : | Understand the basic Concepts of Electrical installations. |

**SYLLABUS**

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| **UNIT-I** | **:** | **DC CIRCUIT ANALYSIS** |
| Electrical Circuit Elements (R, L and C), Voltage and Current Sources, Ohms Laws, Kirchoff’s Laws and Star/Delta Conversion, Network Reduction Techniques-Series-Parallel- Series and Parallel (Only Resistor), Superposition, Thevenin’s and Norton’s Theorems, Problems in Simple Circuits with DC Excitation. | | |
| **UNIT-II** | **:** | **AC CIRCUIT ANALYSIS** |
| 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 R, L, C, RL, RC and RLC Combinations (Series and Parallel), Resonance, Three Phase Circuits- Voltage and Current Relations in Star/Delta Connections-Simple Problems. | | |
| **UNIT-III** | **:** | **DC MACHINES & TRANFORMERS** |
| **DC MACHINES:** Introduction-Construction Details - Principle of Operation - EMF Equation – Classification Based on Excitation - Torque Equation- Characteristics: OCC of DC Shunt Generator-Load Characteristics of DC Shunt Motor, 3-Point Starter – Speed Control by Armature Voltage, Field Control of DC Motors -Simple Problems.  **TRANFORMERS**: Introduction-Constructional Details - Principle of Operation - EMF Equation – OC and SC Test – Equivalent Circuit, Voltage Regulation, Losses and Efficiency. | | |
| **UNIT- IV** | **:** | **AC MACHINES** |
| **3-Ø INDUCTION MOTOR:** Introduction-Construction Details - Principle of Operation- Generation of Rotating Magnetic Fields, Torque-Slip Characteristic. Losses and Efficiency.  **ALTERNATOR:** Introduction-Construction Details - Principle of Operation – Definition for Pitch Factor and Distribution Factor-E.M. F Equation - Determination of Voltage Regulation by E.M.F Method. | | |
| **UNIT-V** | **:** | **ELECTRICAL INSTALLATIONS** |
| Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics of Batteries. Elementary Calculations for Energy Consumption, Battery Backup. | | |

**TEXT BOOKS:**

1. D.P. Kothari and I.J. Nagrath, Basic Electrical Engineering, 3rd edition 2010, Tata McGraw Hill.
2. P. V. Prasad, S. Sivanagaraju, K. R. Varmah, and Chikku Abraham, Basic Electrical Engineering, Cengage, 2019.

**REFERENCE BOOKS:**

1. D.C. Kulshreshtha-, Basic Electrical Engineering 2009, Tata McGraw Hill.
2. L.S. Bobrow, Fundamentals of Electrical Engineering, Oxford University Press, 2011
3. E. Hughes, Electrical and Electronics Technology,10th Edition, Pearson, 2010.
4. Vincent Deltoro, Electrical Engineering Fundamentals, Second Edition, Prentice Hall India, 1989.
5. [V K Mehta](https://www.schandpublishing.com/author-details/-v-k-mehta/196) & [Rohit Mehta](https://www.schandpublishing.com/author-details/-rohit-mehta/160" \o " Rohit Mehta), S “Principles of Electrical Engineering and Electronics”, Chand Publishers,2019 edition.