

# ***Basic Electrical Engineering***

*As per New JNTU Hyderabad Syllabus R 18  
(Common to All branches for B.Tech First Year)*



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(Common to All branches for B.Tech First Year)*

## **Authors**

### **Mr. R. Durga Rao**

Asst. Prof. & Head  
Department of EEE  
JNTUH College of Engineering Manthani  
Ramagiri, Peddapalli -505 212, TS

### **Dr. D. Shobha Rani**

Professor  
Dept. EEE & Controller of Examinations  
Institute of Aeronautical Engineering  
Dundigal, Hyderabad – 500 043, TS

### **Dr. Ramalla Isaac**

Professor  
Department of EEE  
Marri Laxman Reddy Institute of  
Technology and Management  
Dundigal, Hyderabad – 500 043, TS

### **Dr. A. Vinod**

Associate Professor  
Department of EEE  
Marri Laxman Reddy Institute of  
Technology and Management  
Dundigal, Hyderabad – 500 043, TS



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**Head Office**

# 326/C, Level - 4, Surneni Nilayam

Near B K Guda Park, S R Nagar, Hyderabad - 500 038, INDIA

P.No:+91 40 23710657, 238000657 Fax: +91 40 23810657

**Reg. Off**

# 5-68, Pedda Gorpadu, Pakala, Tirupati, Chittoor - 517 112 AP, INDIA

**mail:**studentshelpline.in@gmail.com

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# ***Basic Electrical Engineering***

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## **Course Objectives**

- To introduce the concepts of electrical circuits and its components
- To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
- To study and understand the different types of DC/AC machines and Transformers.
- To import the knowledge of various electrical installations.
- To introduce the concept of power, power factor and its improvement.

## **Course Outcomes**

- To analyze and solve electrical circuits using network laws and theorems.
- To understand and analyze basic Electric and Magnetic circuits
- To study the working principles of Electrical Machines
- To introduce components of Low Voltage Electrical Installations

### **UNIT-I: D.C. Circuits**

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

### **UNIT-II: A.C. Circuits**

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, RLC combinations (series and parallel), resonance in series R-L-C circuit. Three-phase balanced circuits, voltage and current relations in star and delta connections.

### **UNIT-III: Transformers**

Ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

#### **UNIT-IV: Electrical Machines**

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.

#### **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 for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

# *Basic Electrical Engineering*

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