



## GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

### ELECTRICAL AND ELECTRONICS TECHNOLOGY

Course Code: GR15A2026  
II Year II Semester

L:2 T:0 P:1 C:3

#### Prerequisites

- Fundamentals of Modern Physics
- Fundamentals of Electrical laws

#### Course Objectives

- To demonstrate how such circuits are designed
- To provide clear explanation of the working principles of DC & AC machines
- To explain the operation of Transformer and its EMF with losses equation
- To provide clear explanation of the working principles of important electronic devices
- To show how each device is used in appropriate circuits

#### Course Outcomes

- Ability to compare the performance of devices in various applications.
- Ability to explain the working principles of DC & AC machines
- Ability to explain the operation of Transformer and EMF with losses equation
- Ability to get familiar knowledge on several Semiconductor Devices.
- Ability to analyze the working operation of each device in a circuit.

#### Unit-I

**DC Machines:** Principle of operation of DC Generator – EMF equation - types – DC motor types – torque Equation – applications – three point starter.

#### Unit-II

**Transformers:** Principle of operation of single phase transformers – EMF equation – losses – efficiency and Regulation.

**AC Machines:** Principle of operation of alternators – regulation by synchronous impedance method – Principle of Operation of induction motor – slip – torque characteristics – applications

#### Unit-III

**Semiconductors and pn Junction Diode:** Types of semiconductors, Conductivity, Energy bands, charge carriers, doping. Fermi level, temperature



effects, Drift and diffusion currents, recombination and life time, Diode current equations, Junction capacitance, Diode switching characteristics, Zener and avalanche break down Diodes.

### Unit-IV

**Diode Applications, Special Diodes:** Types of Rectifiers: Half wave, Full wave and Bridge rectifiers, operation and analysis of rectifiers without filters, Operation of rectifiers with filters types: L, C, LC, and pi. Special Diodes; Tunnel, LDR, LED, LCD, Varactor Diode.

### Unit-V

**Bipolar Junction Transistor:** Transistor Diode Equivalent Circuit, Transistor biasing, DC load line, current components in BJT, Modes of transistor operation, BJT input and output characteristics in CB, CE CC configuration, BJT as an amplifier, BJT stabilizing and biasing techniques, Thermal runaway, heat sinks.

### Teaching Methodologies

1. Power Point presentations
2. Tutorial Sheets
3. Assignments
4. Lab experiments with Multisim software

### Text Books

1. Electrical machines P.S Bimbra Khanna Publishers
2. David A. Bell; Electronic Devices and Circuits, Oxford University Press, 5th edition, 2008.
3. R.L. Boylestad and Louis Nashelsky; Electronic Devices and Circuits, Pearson/Prentice Hall, 9th Edition, 2006.

### Reference Books

1. Electrical Technology B.L. Theraja, Schand Publishers
2. T.F. Bogart Jr J.S. Beasley and G.Rico; Electronic Devices and Circuits – Pearson Education, 6th edition, 2004.
3. Op-Amps and Linear Integrated Circuits, Ramakant A. Gayakwad, Prentice Hall of India(p) Ltd, 3rd Ed., 2002.