

UES001 ELECTRICAL AND ELECTRONICS SCIENCE

Introduction: Basic electrical quantities, Electric circuit sources and circuit elements and their behavior (Active and passive).

Supply Systems: AC Supply system (Single phase, Three phase–three wire, Three phase–four wire), DC supply system, Their specifications and Comparison. D.C. Networks: Mesh and Nodal Analysis, Star–Delta Transformation, Superposition theorem, Thevenin’s theorem, Norton’s theorem, Maximum power transfer theorem, Step voltage response of RL and RC series circuits.

Sinusoidal Steady-State Response of Circuits: Concept of Phasors, Phasor representation of circuit elements, Complex notation representation, Series and parallel circuits, Power and power factors, Resonance in series and parallel circuits, Balanced 3–phase voltage, Current and power relations, 3–phase power measurement.

Magnetic Circuits: Concept of Magnetic circuits, B–H curve, Calculation of Magnetic Circuits, Iron Losses.

Single–Phase Transformers: Constructional feature, EMF equation, Ideal transformer, Open and short circuit tests, Voltage regulation and efficiency.

Rotating Electrical Machines: Construction, Operating principles and Applications of DC generator, DC motor, Three phase Induction motor and Single phase induction motors.

Electrical safety and Wiring: Electrical safety and standards, House hold wiring and electric appliances.

Energy Management: Conservation efforts, Auditing.

Electronic Devices: P–N diode, BJT, SCR, FET, MOSFET, Their V–I characteristics and applications (Diode as rectifier, Zener diode as voltage regulator).

Laboratory Work

Kirchhoff’s laws, Network theorems, A.C. series and parallel circuits, Resonant circuit, Measurement of power 3–phase circuits, Reactance calculation of variable reactance choke coil, Tests on transformers, Starting methods of DC motor, Three phase induction motor and single phase induction motor, Identification and testing of devices (R,L,C, Diode and Transistor), V–I Characteristics of P–N diode, Zener diode , BJT as amplifier, Use of diode as half wave and full wave rectifier.

Textbooks

1. Smith, I.M., Hiley, J. and Brown, K., *Electrical and Electronic Technology, Dorling Kingsley (2007) 9th ed.*
2. Nagrath, I.J. and Kothari, D.P., *Basic Electrical Engineering, Tata McGraw–Hill (2002) 2nd ed.*
3. Naidu, M.S. and Kamashaiah, S., *Introduction to Electrical Engineering, Tata McGraw–Hill (2004).*

Reference Books

1. Chakrabarti, A., *Basic Electrical Engineering, Tata McGraw–Hill (2008).*
2. Del Toro, V., *Electrical Engineering Fundamentals, Prentice–Hall of India Private Limited (2008) 2nd ed.*