21EE101 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P
45	-	30

Source:
https:// engineering interview questions.com

COURSE DESCRIPTION AND OBJECTIVES:

This course provides an in-sight into the functioning of basic electrical components like resistor, inductor and capacitor. It deals with the constructional and operational details of both DC & AC machines. It also deals with the basic electronic components like P-N junction diode, Zener diode, Transistor and their characteristics.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes
1	Analyze the resistive circuits with independent sources and find its solution.
2	Solve the AC (single and three phase) and DC circuits using different methods.
3	Familiarize the concepts of electromagnetism and it's applications.
4	Explain the types of electrical equipment, machines and its applications.
5	Acquire the knowledge about the characteristics and working principles of semiconductor diodes, transistor.

SKILLS:

✓ Distinguish between linear and nonlinear elements by looking at VI characteristics.

✓ Develop a simple loop generator.

✓ Design a voltage regulator using Zener diode.

✓ Design a half and full wave rectifiers using PN junction diode.

UNIT – I **L - 9**

FUNDAMENTALS OF ELECTRIC CIRCUITS: Concept of network, Active and passive elements, Voltage and current sources, Concept of linearity and linear network, Unilateral and bilateral elements, R, L and C as linear elements, Ohm's Law, Kirchhoff's Laws, Application to simple series, Parallel circuits, Mesh and nodal analysis of resistive circuits with DC source (Simple numerical problem).

UNIT – II **L - 9**

FUNDAMENTALS OF AC CIRCUITS : Generation of AC voltage, Frequency, Average value, R.M.S. value, Form factor, Peak factor for sinusoidal only; Analysis of single-phase ac circuits consisting of R, L, C, RL, RC (series and parallel) (simple numerical problems).

BALANCED THREE PHASE SYSTEMS: Relation between phase and line quantities of voltages and currents in star and delta connected systems (Elementary treatment only).

UNIT – III **L - 9**

FUNDAMENTALS OF ELECTROMAGNETISM: Concepts of Magneto motive force, Reluctance, Flux and flux density, Concept of self inductance and mutual inductance, Coefficient of coupling (only elementary treatment and Simple numerical problems).

TRANSFORMERS: Principle of operation of single phase transformer, Constructional features, EMF equation (simple numerical problems).

UNIT – IV **L - 9**

DC MACHINES: Constructional details of a DC Machine, DC Generator, Principle of operation, EMF equation (simple numerical problems); DC Motor, Principle of operation, Torque equation (simple numerical problems).

AC MACHINES: Principle of operation of three phase induction motor, Slip ring and squirrel cage motors, Torque equation; Constructional details of synchronous machine.

UNIT – V **L - 9**

SEMICONDUCTOR DEVICES: Classification of semiconductors, P-N junction diode - operation and its characteristics, Half wave rectifier - operation, efficiency; Full wave rectifiers - types, operation, efficiency; Zener diode and its characteristics, Zener diode as Voltage regulator, Bi polar junction transistor- operation, types (NPN & PNP).

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS **TOTAL HOURS : 30**

1. Verification of Ohm's law.
2. Verification of Kirchhoff's current law.
3. Verification of Kirchhoff's voltage law.
4. Measurement of Energy in single phase resistive load circuit.
5. Measurement of Power in single phase resistive load circuit.
6. Transformation ratio of a single phase transformer at different loads.
7. Determination of R.M.S. Values of sinusoidal waveform.
8. Determination of impedance in complex AC circuits.
9. Verification of PN junction diode characteristics under both forward and reverse bias.
10. Verification of Zener diode characteristics under reverse bias.

TEXT BOOKS:

1. V. K. Mehta, "Principles of Electrical Engineering and Electronics", 3rd edition, S. Chand & Co., Publications, New Delhi, 2010.
2. D.P. Kothari, "Basic Electrical and Electronics Engineering", 1st edition., TMH, New Delhi, 2014.

REFERENCE BOOKS:

1. Millman and Halkias, "Integrated Electronics", Mc Graw Hill, 1979.
2. A.K. Thereja and B.L.Thereja, "Electrical Technology", Vol.–II, S. Chand & Co., Publications, 2007.
3. U. Bakshi and A. Bakshi, "Basic Electrical Engineering", 1st edition, Technical Publications, Pune, 2005.

ACTIVITIES:

o *Decoding the value of resistors.*

o *Design and fabricate a simple loop permanent magnet generator.*

o *Design and fabricate a simple air cored transformer.*

o *Fabricate full and half wave rectifiers using PN junction diodes.*

o *Fabricate a voltage regulator using Zener diode.*