

COURSE TITLE	BASICS OF ELECTRICAL ENGINEERING
COURSE CODE	01EE1111
COURSE CREDITS	5

Objective:

- 1 Students are expected to learn basics of Electrical Engineering which will help them to apply these concepts in day-to-day life
- 2 Students are expected to learn basics of Electrical Engineering which will help them to apply these concepts in day to day life.

Course Outcomes: After completion of this course, student will be able to:

- 1 Interpret the role of basic electrical components and their behavior under various system conditions
- 2 Describe qualitative comparison between AC and DC system
- 3 Apply various laws and techniques to solve DC and AC Circuits.
- 4 Analyze and solve magnetic and electrostatic circuits.
- 5 Illustrate the role of electrical apparatus used in household applications.

Pre-requisite of course:NA

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
4	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	Fundamental of DC Circuits Electrical circuit terminologies,, Kirchhoff's Laws,, Nodal Analysis,, Mesh Analysis of Electrical Networks,, Effect of variation in temperature on resistance, Open Circuit and Short Circuit,, Effect of variation in temperature on resistance, Open Circuit and Short Circuit,, Comparison between series and parallel circuits	10
2	Magnetic Circuits and Electromagnetics: Definition of magnetic quantities,, Magnetic circuits, Comparison of electric and magnetic circuits,, Leakage flux, Faraday's Laws,, Induced emf and direction of induced emf, self inductance,, mutual inductance, coefficient of coupling, inductance of coupled coils,, energy stored in magnetic field, Charging and discharging of inductor	10

Contents : Unit	Topics	Contact Hours
3	Electrostatics and Capacitance: Electric charge, permittivity, Coulomb's law, Electric Flux, Electric Field, Flux density,, Electric field Intensity, Electric potential and potential gradient, Dielectric strength,, Capacitor, Parallel-plate capacitor,, types of capacitors, series and parallel Connection of capacitors,, energy stored in capacitor, charging and discharging of capacitor.	10
4	Fundamental of AC Quantities: Generation of Alternating voltage, sinusoidal function Terminology,, Phase and Phase Difference, Phasor representation of alternating quantities,, Phasor addition and subtraction,, Analysis of purely resistive, inductive and capacitive circuits,, Analysis of series RL, RC and RLC circuit,, Active, Reactive and Apparent Power, Power Factor and its significance,, Parallel and series-parallel AC circuits, phasor method,, admittance method, series and parallel resonance,, Comparison of series and parallel resonance circuits	12
5	Three Phase Systems: Introduction of Polyphase systems, Generation of three phase emf,, phase sequence, star connection,, delta connection, power in three phase systems,, Measurement of power and power factor in balanced three phase load,, Advantages of three phase system	8
6	Batteries and Safety Protection: Electric cell, types of cells,, Equivalent circuits, grouping of cells, batteries,, batteries, capacity of battery, efficiency of battery, charging method,, Life of battery, Application of battery, Battery maintenance procedure,, Electric Shock, First aid for electric shock, importance of grounding,, Fuse, MCB, ELCB.	6
Total Hours		56

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	Experiment-1 Measurement of Various Terminologies related to AC signals	2
2	Experiment-2 Determine the relationship in series and parallel connected capacitors	2
3	Experiment-3 Obtain the B-H curve for a magnetic circuit	2
4	Experiment-4 Obtain the transient response of RL & RC Circuit	2
5	Experiment-5 Measure the power and determine the power factor in a single-phase RL circuit	2
6	Experiment-6 Determine the parameters of the series RL circuit	2

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
7	Experiment-7 Determine parameters of the series RLC circuit	2
8	Experiment-8 Relate line quantity and phase quantity in a 3-phase circuit	2
9	Experiment-9 Determination of power in a three-phase balanced circuit using two wattmeter method	2
10	Experiment-10 Demonstrate the use of the number of cells of the battery to get desired output	2
11	Experiment-11 Demonstrate the working of MCB and ELCB	2
12	Experiment-12 Calculation of energy consumption and billing system in the residential electricity bill.	2
Total Hours		24

Textbook :

- 1 Basic Electrical Engineering, V.N. Mittal, Tata Mcgraw-Hill, 2nd edition, 2006
- 2 Electrical Technology, B. L. Theraja, S. Chand Publication, 2012
- 3 Elements of Electrical Engineering, U. A. Patel, Atul Prakashan, 8th edition, 2009

References:

- 1 Electrical and Electronic Technology, Electrical and Electronic Technology, E. Hughes, Prentice Hall India, 10th edition, 2008
- 2 Electrical Engineering Fundamentals, Electrical Engineering Fundamentals, V. Del Toro, Prentice - Hall India, 2nd edition, 2006
- 3 Theory and Problems in Basic Electrical Engineering, Theory and Problems in Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Prentice Hall India., 1998
- 4 Basic Electrical Engineering, Basic Electrical Engineering, A. Chakrabarti, S. Nath, C. Chanda, Tata McGrawHill Education India Pvt. Ltd, 2013

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
20.00	30.00	25.00	15.00	10.00	0.00

Instructional Method:

- 1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, case studies etc.
- 2 The internal evaluation will be done on the basis of continuous evaluation of students in the class-room.
- 3 Practical examination will be conducted at the end of semester for evaluation of performance of students in classroom.
- 4 Students will use supplementary resources such as online videos.

Supplementary Resources:

- 1 <http://nptel.ac.in/courses/108108076/>
- 2 <http://nptel.ac.in/downloads/108105053/>
- 3 <http://www.electrical4u.com/nature-of-electricity/>
- 4 <http://vlab.amrita.edu/index.php>
- 5 <https://www.coursera.org/course/eefunlab>