



BMS COLLEGE OF ENGINEERING, BANGALORE-560 019
Department of Electrical and Electronics Engineering
BATCH 2018-19 Onwards

COURSE CODE	18EE1ESELE/18EE2ESELE	COURSE TITLE	ELEMENTS OF ELECTRICAL ENGINEERING
CREDITS	04	L-T-P	3-0-1

COURSE OBJECTIVES:

To introduce fundamental concepts and techniques to analyse the behaviour of electrical circuits. To provide the details regarding principle of operation and methods to evaluate the performance of electrical apparatus. To impart an overview about electrical wiring and protection mechanisms for domestic applications

UNIT-I

D.C.Circuits: Review of Ohm's Law, analysis of series, parallel and series- parallel circuits excited by independent voltage sources. Power and energy, Kirchhoff's laws, branch current method, superposition theorem, illustrative examples.

DC motors: Construction and principle of operation, back emf, torque equation, types of dc motors, characteristics of dc motors (shunt and series motors only) and applications, illustrative examples. **(7HOURS)**

UNIT-II

A.C. Fundamentals: Generation of sinusoidal voltage, frequency of generated voltage, definitions and expressions for average value, root mean square value, form factor and peak factor of sinusoidally varying voltage and current, phasor representation of alternating quantity, illustrative examples.

A.C.Circuits: Analysis with phasor diagram of circuits with R, L, C, R-L, R-C, R-L-C for series and parallel configurations. Real power, reactive power, apparent power and power factor, illustrative examples. **(7HOURS)**

UNIT-III

Three Phase Synchronous Generator: Basic parts, principle of operation, synchronous speed, frequency of generated voltage, emf equation. Concept of winding factor (excluding the derivation of distribution and pitch factors), illustrative examples.

Three phase AC Circuits: Three-phase balanced circuits, voltage and current relations in star and delta connections. Measurement of three phase power using two wattmeter method, effect of power factor on wattmeter readings, illustrative examples. **(8HOURS)**

UNIT-IV

Single Phase Transformers: Construction and principle of operation, emf equation, losses, variation in losses with respect to load, efficiency, condition for maximum efficiency, illustrative examples. **(6HOURS)**

UNIT-V

Three Phase Induction Motors: Concept of rotating magnetic field, construction and working of a three-phase induction motor, slip and its significance, illustrative examples.

Domestic Wiring: Service mains, meter board and distribution board. Types of wires and Cables used in domestic wiring, power requirement calculation for domestic applications. Elementary discussion on circuit protective devices, fuse and Miniature Circuit Breaker (MCB's). Earthing: pipe and plate earthing, engineering practice for domestic earthing.

(8HOURS)

LIST OF EXPERIMENTS:

EXPT NO	LIST OF THE EXPERIMENTS	SKILL
1	Verification of KCL and KVL for DC circuit.	Conduct and analyse
2	Measurement of Power and Power factor in a single phase lighting circuit.	Conduct and analyse
3	Measurement of Power and Power factor in a single phase power load circuit.	Conduct and analyse
4	Verification of voltage and current relationship in a Three phase Star connected load.	Conduct and verify
5	Verification of voltage and current relationship in a Three phase Delta connected load.	Conduct and verify
6	The speed versus torque characteristic of a DC Shunt motor.	Conduct and verify
7	Load test on single phase Transformer	Conduct and verify
8	Measurement of Power and Power factor in a Three phase Star connected load.	Conduct and analyse
9	Measurement of Power and Power factor in a Three phase delta connected load.	Conduct and analyse
10.	Measurement of resistance and inductance of a choke coil using AVW method.	Conduct and analyse
10	Observation of phase differences between current and voltage	Learn
11	Experiment on safety devices and Earthing	Learn engineering practices

TEXT BOOKS:

- "Basic Electrical Engineering", D.C.Kulshreshta (2009), 1st Edition, Tata-McGraw-Hill.
- "Basic Electrical Engineering", N. Narasimhaswamy (2015), 1st Edition, EBPB publishers.

REFERENCE BOOKS:

- "Electrical and Electronics Technology" E. Hughes (Revised by J. Hiley, K. Brown

and I.M.Smith), 9th Edition, Pearson Education, 2005.

b. "Problems in Electrical Engineering" S.S.Parker Smith and N.N Parker Smith.

c. "Electrical Science", P. M. Chandrashekharaiyah, Rajeshwari Publications.

E-BOOK:

a. <http://nptel.ac.in/courses/108105053/>

ONLINE VIDEO LECTURES:

a. <http://nptel.ac.in/courses/108108076/>

COURSE OUTCOMES AND PROGRAM OUTCOMES:

Course Outcome	CO	PO
Understand the basic concepts of DC, AC circuits and Electrical Machines	CO1	--
Apply the basic knowledge of mathematics, science and electrical engineering to obtain the desired parameters/performance characteristics of Electric circuits and Machines	CO2	PO1
Analyse the behaviour of Electric circuits, transformers and Electrical machines	CO3	PO2
Conduct a study on safety aspects, wiring and consumption of electrical power in domestic installations	CO4	PO6
Conduct experiments and study the performance of electrical machines, AC and DC circuits	CO5	PO4
Norms of engineering practice for domestic earthing	CO6	PO8

ASSESSMENT DETAILS FOR CIE:

Assessment Tool	Remarks	Marks
Internals	Two	20
Quiz/AAT	One	05
Laboratory	Record + Test + Viva-Voce	25
Total		50