FUNDAMENTALS OF ELECTRICAL ENGINEERING

I Semester: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
AEEB01	**Foundation**	3	1	-	4	30	70	100
Contact Classes: 45	**Tutorial Classes: 15**	**Practical Classes: Nil**				**Total Classes: 60**		

I. COURSE OVERVIEW:

This course introduces the concepts of basic electrical engineering parameters, quantities, analysis of DC circuits. The course teaches different fundamental laws Ohms laws, Kirchhoff laws and different electrical concepts. The students will be able to analyze networks using graph theory and circuit theorems like Thevenin's and Norton's theorems. It also describes the concept of AC circuits andtheir applications.

II. OBJECTIVES:

The course should enable the students to:

I Understand the basic electrical circuits and circuit laws to study behavior ofelectrical networks.

II Use different network reduction techniques to study characteristics of electricalnetworks and graph theory to simplify complex networks.

III Analyze series and parallel AC circuits using complex notation.

IV State and use DC circuit theorems to determine unknown currents and voltages.

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

CO 1	**Know** the fundamental concepts of electric circuits for computing voltage and current relationship of passive elements.	Understand
CO 2	**Solve** complex electrical circuits by applying network reduction techniques for reducing into a simplified circuit.	Apply
CO 3	**Make use of** various network theorems for simplifying complexelectrical networks.	Apply
CO 4	**Define** basic nomenclature of single phase AC circuits for obtaining impedance, admittance of series and parallel circuits.	Remember
CO 5	**Interpret** the power factor in single phase circuits with various combination of network elements for computing active and reactivepower.	Understand
CO 6	**Explain formation of** incident, cut-set and tie set matrices using which characteristics of electrical circuits can be studied.	Understand

IV. SYLLABUS:

MODULE - I	**INTRODUCTION TO ELECTRICAL CIRCUITS**	**Classes: 09**

Circuit concept: Basic definitions, Ohm's law at constant temperature, classification of elements, R, L, C parameters, independent and dependent sources, Kirchhoff's laws, equivalent resistance of series, parallel and series parallel networks.

MODULE - II	**ANALYSIS OF ELECTRICAL CIRCUITS**	**Classes: 10**

Circuit analysis: source transformation, Star to delta and delta to star transformation, mesh analysis and nodal analysis, inspection method, super mesh, super node analysis; DC Theorems: Thevenin's and Norton's.

MODULE - III	INTRODUCTION TO AC CIRCUITS	Classes: 09

Single phase AC circuits: Representation of alternating quantities, instantaneous, peak, RMS, average, form factor and peak factor for different periodic wave forms.

Phase and phase difference, j notation, representation of rectangular and polar forms. Concept of reactance, impedance, susceptance and admittance.

MODULE -IV	COMPLEX POWER ANALYSIS	Classes: 09

Concept of real, reactive, apparent power and complex power, power factor in single phase AC circuits consisting of R, L, C, RL, RC and RLC combinations.

MODULE - V	NETWORK TOPOLOGY	Classes: 08

Network Topology: Definitions, Graph, Tree, Incidence matrix, Basic cut set and Basic Tie set Matrices for Planar Networks, Duality and Dual Networks.

Text Books:

1. A Chakrabarthy, "Electric Circuits", DhanipatRai& Sons, 6th Edition, 2010.
2. A Sudhakar, Shyammohan S Palli, "Circuits and Networks", Tata McGraw-Hill, 4th Edition, 2010.
3. M E Van Valkenberg, "Network Analysis", PHI, 3rd Edition, 2014.

Reference Books:

1. John Bird, "Electrical Circuit Theory and Technology", Newnes, 2nd Edition, 2003.
2. C L Wadhwa, "Electrical Circuit Analysis including Passive Network Synthesis", New Age International, 2nd Edition, 2009.
3. David A Bell, "Electric circuits", Oxford University Press, 7th Edition, 2009.

Web References:

1. https://www.igniteengineers.com
2. https://www.ocw.nthu.edu.tw
3. https://www.uotechnology.edu.iq
4. https://www.iare.ac.in

E-Text Books:
1. https://www.bookboon.com/en/concepts-in-electric-circuits-ebook
2. https://www.www.jntubook.com
3. https://www.allaboutcircuits.com
4. https://www.archive.org