FUNDAMENTALS OF ELECTRICAL AND ELECTRONICS ENGINEERING

II Semester: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
AEE001	**Foundation**	3	1	-	4	30	70	100

Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil	Total Classes: 60

OBJECTIVES:

The course should enable the students to:

I. State the Ohms law, Kirchhoff's laws associated with electrical network to study its characteristics and understand concept of mutual inductance.
II. Apply network reduction technique ,network theorems , graph theory to solve complex electrical network
III. Analyse the behaviour of RLC circuit with sinusoidal input and summarise futures of three phase supply
IV. Illustrate the V-I characteristics of various diodes and bi-polar junction transistor.

COURSE LEARNING OUTCOMES (CLOs):

1. Understand the concept of circuit, classification of elements and types of energy sources.
2. State different laws associated with electrical circuits and apply source transformation technique to determine equivalent resistance and source current
3. Explain Energy due to mutual induction and constraint on mutual inductance.
4. Determine mesh currents, node voltages using network reduction techniques and define the various nomenclature related with network topology.
5. Prove the law of conservation of energy, Superposition principle, reciprocity and maximum power transfer condition for the electrical network with DC excitations.
6. Summarize the procedure of Thevenin's, Norton's and Milliman's theorems to reduce complex network into simple equivalent network.
7. Explain the steps of compensation, zero current and voltage shift theorem to predict constraints of electrical networks.
8. Analyze the steady state behavior of series and parallel RL, RC and RLC circuit with sinusoidal excitation.
9. Identify the alternating quantities with it instantaneous, average and root mean square values.
10. Explain balance and unbalanced three phase circuits.
11. Illustrate the operation and biasing of PN junction diode, Zener diode.
12. Compare the operation of half wave, full wave and bridge rectifiers.
13. Demonstrate the Zener diode as a voltage regulator.
14. Compare different configurations of Transistor
15. Summarize the DC load line and characteristics of BJT
16. Operate the transistor as an amplifier
17. Process the knowledge and skills for employability and to succeed national and international level competitive examinations.

UNIT-I	ELECTRIC CIRCUIT ELEMENTS	Classes: 09

Electric circuit elements: Voltage and current sources, linear, non linear, active and passive elements, inductor current and capacitor voltage continuity, Kirchhoff's laws, elements in series and parallel, superposition in linear circuits, controlled sources, energy and power in elements, energy in mutual inductor and constraint on mutual

inductance.
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UNIT-II	NETWORK ANALYSIS AND THEOREMS	Classes: 09

Network analysis: Nodal analysis with independent and dependant sources, modified nodal analysis, mesh analysis, notion of network graph, nodes, trees, twigs, links, co-tree, independent sets of branch currents and voltages; Network theorems: Voltage shift theorem, zero current theorem, Tellegen's theorem, reciprocity, substitution theorem, Thevenin's and Norton's theorems, pushing a voltage source through a node, splitting a current source, compensation theorem, maximum power transfer theorem

UNIT-III	AC CIRCUITS	Classes: 09

RLC circuits: Natural, step and sinusoidal steady state responses, series and parallel RLC circuits. AC signal measurement: Complex, apparent, active and reactive power, power factor.

Introduction to three phase supply: Three phase circuits, star-delta transformations, balance and unbalanced three phase load, power measurement, two wattmeter method.

UNIT-IV	SEMICONDUCTOR DIODE AND APPLICATIONS	Classes: 09

P-N junction diode, symbol, V-I characteristics, half wave rectifier, full wave rectifier, bridge rectifier and filters, diode as a switch, Zener diode as a voltage regulator.

UNIT-V	BIPOLAR JUNCTION TRANSISTOR AND APPLICATIONS	Classes: 09

DC characteristics, CE, CB, CC configurations, biasing, load line, Transistor as an amplifier.

Text Books:

1. A. Chakrabarti, "Circuit Theory", Dhanpat Rai Publications, 6th Edition, 2004.
2. K. S. Suresh Kumar, "Electric Circuit Analysis", Pearson Education, 1st Edition, 2013.
3. William Hayt, Jack E. Kemmerly S. M. Durbin, "Engineering Circuit Analysis", Tata Mc Graw Hill, 7th Edition, 2010.
4. R. L. Boylestad, Louis Nashelsky,"Electronic Devices and Circuits", PEI/PHI, 9th Edition, 2006.
5. S. Salivahanan, N Suresh kumar, "Electronic Devices and Circuits", McGraw-Hill, 4th Edition.

Reference Books:

1. A Sudhakar, Shyammohan S Palli, "Circuits and Networks", Tata McGraw-Hill, 4th Edition.
2. R. L. Boylestad , Louis Nashelsky,"Electronic Devices and Circuits", PEI/PHI, 9th Edition, 2006.
3. David A.Bell,"Electric Circuits", Oxford University Press, 9th Edition, 2016.
4. M. Arshad,"Network Analysis and Circuits", Infinity Science Press, 9th Edition, 2016.
5. A. Bruce Carlson,"Circuits", Cengage Learning, 1st Edition, 2008

Web References:

1. http:// www.nptel.ac.in/Courses/117106108
2. http:// www.powerlab.ee.ncku.edu.tw
3. http:// www.textofvideo.nptel.iitm.ac.in