ELECTRICAL CIRCUIT ANALYSIS LABORATORY

II Semester: ECE									
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
AEEB06	**Foundation**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		-	-	3	1.5	30	70	100
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 36**				**Total Classes: 36**		

COURSE OBJECTIVES:

The course should enable the students to:

I Examine the basic laws and network reduction techniques.
II Predict the characteristics of sinusoidal function.
III Calculate and verify the electrical quantities in series RL, RC and RLC circuit.
IV Discuss the faradays laws of electromagnetic induction and magnetic circuits.
V Prove the various theorems used to reduce the complexity of electrical network

COURSE OUTCOMES (COs):

CO 1 Understand and analyze basic AC and DC electrical circuits.
CO 2 Apply mesh analysis and nodal analysis to solve electrical networks.
CO 3 Illustrate single phase AC circuits and apply steady state analysis to time varying circuits.
CO 4 Discuss the faradays laws of electromagnetic induction and magnetic circuits.
CO 5 Understand the characteristics of complex electrical networks using DC and AC Theorems.

COURSE LEARNING OUTCOMES (CLOs):

1. Analyze the circuits using Kirchhoff’s current and Kirchhoff’s voltage law.
2. Use of series-parallel concepts for simplifying circuits.
3. Use star delta transformation for simplifying complex circuits.
4. Understand the characteristics of basic electrical and electronics components.
5. Understand the concept of circuit, classification of elements and types of energy sources.
6. State different laws associated with electrical circuits and apply source transformation technique to determine equivalent resistance and source current.
7. Apply the network reduction techniques directly and indirectly to calculate quantities associated with electrical circuit
8. Apply Ohm's law and Kirchhoff's laws to determine equivalent resistance, current and voltage in any branch of a circuit.
9. Calculate the loop current and node voltages in complex circuits using network topology.
10. Identify the alternating quantities with it instantaneous, average and root mean square values.
11. Demonstrate the impression of reactance, susceptance, impedance and admittance in estimating power of AC circuits.
12. Demonstrate the concept of rectangular and polar form AC circuits.
13. Demonstrate the concept of power, real, reactive and complex power, power factor of AC circuits
14. Analyze the steady state behavior of series and parallel RL, RC and RLC circuit with sinusoidal excitation.
15. Design the series and parallel RLC for the required bandwidth, resonant frequency and quality factor.
16. State the faraday’s laws of electromagnetic induction used in construction of magnetic Circuit.
17. Summarize the procedure of thevenin’s, norton’s and milliman’s theorems to reduce complex network into simple equivalent network.

LIST OF EXERCISES	
Week. 1	**OHM‟S LAW, KVL AND KCL**
Verification of Ohm‟s law, KVL and KCL using hardware and digital simulation.	
Week. 2	**MESH ANALYSIS**
Determination of mesh currents using hardware and digital simulation	
Week. 3	**NODAL ANALYSIS**
Measurement of nodal voltages using hardware and digital simulation.	
Week. 4	**SINGLE PHASE AC CIRCUITS**
Calculation of average value, RMS value, form factor, peak factor of sinusoidal wave using hardware.	
Week. 5	**IMPEDANCE OF SERIES RL, RC, RLC CIRCUIT**
Examine the impedance of series RL,RC,RLC Circuit	
Week. 6	**SERIES RESONANCE**
Verification of series resonance using hardware and digital simulation	
Week. 7	**PARALLEL RESONANCE**
Verification of parallel resonance using hardware and digital simulation.	
Week. 8	**SUPER POSITION THEOREM**
Verification of super position using hardware and digital simulation.	
Week. 9	**RECIPROCITY THEOREM**
Verification of reciprocity using hardware and digital simulation.	
Week. 10	**MAXIMUM POWER TRANSFER THEOREM**
Verification of maximum power transfer theorem using hardware and digital simulation.	
Week. 11	**THEVENINS THEOREM**
Verification of thevenin's theorem using hardware and digital simulation.	
Week. 12	**NORTONS THEOREM**
Verification of Norton's theorem using hardware and digital simulation.	
Week. 13	**COMPENSATION THEOREM**
Verification of compensation theorem using hardware and digital simulation.	
Week. 14	**MILLIMAN'S THEOREM**
Verification of milliman's theorem using hardware and digital simulation.	

Reference Books:
1. A Chakrabarti, "Circuit Theory", Dhanpat Rai Publications, 6th Edition, 2006. 2. William Hayt, Jack E Kemmerly S.M. Durbin, "Engineering Circuit Analysis", Tata McGraw Hill, 7th Edition, 2010.
Web References:
1. https://www.ee.iitkgp.ac.in 2. https://www.citchennai.edu.in