FUNDUMENTALS OF ELECTRICAL ENGINEERING LABORATORY

I Semester: CSE | IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AEEB05	Foundation	-	-	3	2	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 48				Total Classes: 48		

OBJECTIVES:

The course should enable the students to:

I. Examine the basic laws and network reduction techniques.
II. Measure impedance of series RL, RC and RLC circuits.
III. Prove the various theorems used to reduce the complexity of electrical network.

COURSE OUTCOMES (COs):

CO 1 Understand the basic concepts of electricity, electrical circuits elements, application's of Kirchhoff laws to complex circuits.
CO 2 Explore to the working of mesh analysis and nodal analysis, inspection method, super mesh, super node analysis.
CO 3 Summarize various alternating quantities such as instantaneous, peak, RMS, average, form factor and peak factor for different periodic wave forms.
CO 4 Discuss the basic theory of real, reactive, apparent power and complex power, power factor.
CO 5 Explain the theories of Thevinins theorem and Norton's theorem.

COURSE LEARNING OUTCOMES (CLOs):

The students should enable to:

1. Understand the application of basic concept of electrical circuits KCL and KVL in series and parallel circuits.
2. Understand the basic concept of electrical circuits Ohm's law.
3. Summarize the procedure of mesh analysis.
4. Summarize the procedure of nodal analysis.
5. List out various alternating quantities such as Sinusoidal AC voltage, average and RMS values, form and peak factor, and understand concept of three phase alternating quantity.
6. Interpret the alternating quantities with its instantaneous, average and root mean square values.
7. Illustrate the concept of impedance, reactance, admittance, susceptance and conductance.
8. Analyze the steady state behavior of R, L and C elements with sinusoidal excitation.
9. Analyze the steady state behavior of series and parallel RL and RC circuits with sinusoidal excitation.
10. Analyze the steady state behavior of series and parallel RLC circuits with sinusoidal excitation.
11. Interpret the power factor in single phase AC circuits.
12. Apply network reduction techniques to calculate unknown quantities associated with electrical circuits.
13. Summarize the procedure of Thevinins theorem.
14. Summarize the procedure of Norton's theorem.

LIST OF EXPERIMENTS	
Expt - 1	**OHM'S LAW , KIRCHOFF'S CURRENT LAW AND VOLTAGE LAW**
Verification of ohm's law, Kirchhoff's current and voltage laws using hardware and digital simulation.	
Expt - 2	**VOLT – AMPHERE METHOD**
Determination of unknown resistance and its temperature dependency.	
Expt - 3	**MESH ANALYSIS**
Determination of mesh currents using hardware and digital simulation.	
Expt - 4	**NODAL ANALYSIS**
Measurement of nodal voltages using hardware and digital simulation.	
Expt - 5	**SINGLE PHASE AC CIRCUITS**
Calculation of average value, RMS value, form factor, peak factor of sinusoidal wave.	
Expt - 6	**IMPEDANCE OF SERIES RL CIRCUIT**
Examine the impedance of series RL Circuit	
Expt - 7	**IMPEDANCE OF SERIES RC CIRCUIT**
Measure the impedance of series RC Circuit	
Expt - 8	**IMPEDANCE OF SERIES RLC CIRCUIT**
Calculate the impedance of series RLC Circuit	
Expt - 9	**MEASUREMENT OF POWER CONSUMED BY A FLUORESCENT LAMP**
To obtain power consumed and power factor of a fluorescent lamp, operated at different voltages.	
Expt - 10	**CHOKE COIL PARAMETERS**
Determination of internal resistance and inductance of choke coil.	
Expt - 11	**THEVENIN'S THEOREM**
Reform conversion of complex network into simple series circuit.	
Expt - 12	**NORTON'S THEOREM**
Reform conversion of complex network into simple parallel circuit.	

Text 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.
3 K S Suresh Kumar, "Electric Circuit Analysis", Pearson Education, 1st Edition, 2013.

Reference Books:
1. David A Bell, “Electric Circuits”, Oxford University Press, 9th Edition, 2016 2. U A Bakshi,Atul P Godse “Basic Electrical and Electronics Engineering”, Technical Publications, 9th Edition, 2016. 3. A Bruce Carlson, “Circuits”, Cengage Learning, 1st Edition, 2008. 4. M Arshad, “Network Analysis and Circuits”, Infinity Science Press, 9th Edition, 2016.

Web References:
1. https://www.ee.iitkgp.ac.in 2. https://www.citchennai.edu.in 3. https://www.iare.ac.in