# ELECTRICAL CIRCUITS LABORATORY

**II Semester: ECE / EEE**

| Course Code | Category | Hours / Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIA | SEE | Total |
| AEEC03 | Foundation | - | - | 3 | 1.5 | 30 | 70 | 100 |
| Contact Classes: Nil | Tutorial Classes: Nil | Practical Classes: 36 | | | | Total Classes: 36 | | |

**Prerequisites: There are no prerequisites to take this course.**

## I. COURSE OVERVIEW:

Electrical circuits laboratory experiments are designed to expose students into the practical executions of the fundamental analysis and techniques of Electrical and Electronics Engineering. This laboratory covers all the basic devices, examines the basic laws, network reduction techniques, network theorems, characteristics of AC Circuits, two port network, design of transformer, measurement of electrical parameters and includes the basic concepts of MATLAB. The purpose of laboratory is to continue tobuild circuit construction skills using different circuit elements.

## II. COURSE OBJECTIVES:

**The students will try to learn:**

| | |
|---|---|
| I | The basic laws, network reduction techniques and theorems for different circuits. |
| II | The characteristics of AC and two port networks for measurement of electricalquantities. |
| III | The properties and construct of electromagnetic induction used in magneticcircuits. |

## III. COURSE OUTCOMES:

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

| | | |
|---|---|---|
| CO 1 | **Solve** the source resistance, currents, voltage and power using various laws associated with electrical circuits. | Apply |
| CO 2 | **Analyze** the alternating quantities for different periodic waveforms. | Understand |
| CO 3 | **Perform** the superposition principle, reciprocity and maximum power transfer condition for the electrical network with DC excitation. | Apply |
| CO 4 | **Demonstrate** the venin's and Norton's theorems to reduce complex network into simple equivalent network with DC excitation. | Apply |
| CO 5 | **Calculate** the faraday's laws of electromagnetic induction used in construction of magnetic circuit. | Analyze |
| CO 6 | **Use of** the two port parameters to be measure easily, without solving for all the internal voltages and currents in the differentnetworks. | Apply |

## IV. SYLLABUS:

**Expt. 1: VERIFICATION OF OHM'S LAW AND KIRCHOFF LAWS**

Draw the V-I characteristics of resistor element, examine voltage and current division in an electrical circuit using hardware and digital simulation.

**Expt. 2: MESH ANALYSIS**

Determination of mesh currents in complex electrical circuit using hardware and digital simulation.

**Expt. 3: NODAL ANALYSIS**

Determination of nodal voltages in complex electrical circuit using hardware and digital simulation.

**Expt. 4: CHARECTERISTICS OF PERIODIC WAVEFORMS**

Calculate Instantaneous, Peak, Peak to peak, Average and RMS values of periodic wave form using hardware and digital simulation.

**Expt. 5: DETERMINATION OF CIRCUIT IMPEDANCE**

Find the impedance of series RL, RC and RLC circuits using hardware and digital simulation.

**Expt. 6: THEVENIN'S THEOREM**
Determine load or unknown current using Thevenin's equivalent circuit using hardware and digital simulation.

**Expt. 7**: **NORTON'S THEOREM**
Determine load or unknown current using Norton's equivalent circuit using hardware and digital simulation.

**Expt. 8**: **SUPERPOSITION THEOREM**
Verify of superposition theorem using hardware and digital simulation.

**Expt. 9: RECIPROCITY THEOREM**
Verify of reciprocity theorem using hardware and digital simulation.

**Expt. 10: SERIES AND PARALLEL RESONANCE**
Verification of series and parallel resonance using hardware and digital simulation.

**Expt. 11: MEASUREMENT OF POWER CONSUMED BY A FLUORESCENT LAMP**
Examine the power consumed by Fluorescent lamp using electrical devices using hardware and digital simulation.

**Expt. 12**: **DESIGN OF CHOKE AND SMALL TRANSFORMER**
Measure resistance and inductance of coil and construct the winding of transformer using winding machine using hardware and digital simulation.

**Expt. 13: Z AND Y PARAMETERS**
Determine the open circuit and short circuit parameters for two port network using hardware and digital simulation.

**Expt. 14**: **H AND ABCD PARAMETERS**
Determine the hybrid and transmission line parameters for two port network using hardware and digital simulation.

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


## VI. WEB REFERENCES:

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