BASIC ELECTRICAL ENGINEERING LABORATORY

I Semester : CSE /CSE (AI & ML) / CSE (DS) / CSE (CS) / CSIT / IT								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
AEEC04	**Foundation**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		-	-	3	1.5	30	70	100
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 42**				**Total Classes: 42**		
Prerequisites: Linear Algebra and Calculus								

I. COURSE OVERVIEW:

The objective of the Basic Electrical Engineering Laboratory lab is to expose the students to the electrical circuits and give them experimental skill. The purpose of lab experiment is to continue to build circuit construction skills using different circuit element. It provides hands-on experience by examining the electrical characteristics of various AC and DC machines.

II. COURSE OBJECTIVES:

The students will try to learn:

I   Implement different circuits and verify circuit concepts for DC circuits.

II   Measure the impedance of series RL, RC and RLC circuits.

III   Prove the various theorems used to reduce the complexity of electrical network.

IV   The operation and characteristics of AC machines and DC machines.

III. COURSE OUTCOMES:

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

CO 1 **Solve** the electrical circuit source resistance, currents, voltage and power by applying various network reduction techniques.   Apply

CO 2 **Apply** various network theorems to reduce complex network into simple equivalent network with DC excitation.   Apply

CO 3 **Examine** the alternating quantities for different periodic wave forms and the impedance of series RC, RL and RLC circuits.   Understand

CO 4 **Apply** magnetization characteristics of dc shunt generator for calculating the critical resistance and speed control methods and performance characteristics of DC Shunt machine for efficiency.   Apply

CO 5 **Examine** the performance of single-phase transformers, induction motors and alternator by calculating efficiency and regulation .   Understand

IV. SYLLABUS:

Expt. 1 : OHM'S LAW, KVL AND KCL
Verification of Ohm's, Verification of Kirchhoff's current law and Voltage law using hardware and digital simulation.

Expt. 2: MESH ANALYSIS
Determination of mesh currents using hardware and digital simulation.

Expt. 3: NODAL ANALYSIS
Measurement of nodal voltages using hardware and digital simulation.

Expt. 4: IMPEDANCE OF SERIES RL AND RC CIRCUIT
Examine the impedance of series RL and RC circuit using digital simulation.

Expt. 5: IMPEDANCE OF SERIES RLC CIRCUIT
Measure the impedance of series RLC Circuit using hardware and digital simulation.

Expt. 6: SINGLE PHASE AC CIRCUITS

Determination of average value, RMS value, form factor, peak factor of sinusoidal wave using digital simulation.

Expt. 7: **SUPERPOSITION AND MAXIMUM POWER TRANSFER THEOREM**
Verification of superposition and maximum power transfer theorem using hardware and digital simulation.

Expt. 8: **THEVENINS AND NORTON'S THEOREM**
Verification of Thevenin's and Norton's theorem using hardware and digital simulation.

Expt. 9: **SWINBURNE"S TEST**
Predetermination of efficiency of DC shunt machine.

Expt. 10: **MAGNITETIZATION CHARACTERISTICS**
Determine the critical field resistance from magnitetization characteristics of DC shunt generator.

Expt. 11: **BRAKE TEST ON DC SHUNT MOTOR**
Study the performance characteristics of DC shunt motor by brake test.

Expt. 12: **SPEED CONTROL OF DC SHUNT MOTOR**
Verify the armature and field control techniques of DC shunt motor.

Expt. 13: **OPEN CIRCUIT AND SHORT CIRCUIT TEST ON SINGLE PHASE TRANSFORMER**
Determination of losses and efficiency of single phase transformer.

Expt. 14: **SYNCHRONOUS IMPEDENCE METHOD**
Determine the regulation of alternator using synchronous impedance method.

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.
4. Etter, "Introduction to MATLAB 7", Pearson Education, 1st Edition, 2008.

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