MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
Accredited by NAAC with 'A' Grade & Recognized Under Section 2(f) & 12(B) of the UGC act,1956

COURSE CONTENT

ELECTRICAL ENGINEERING LAB								
II Semester: ECE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
2520273	Core	L	T	P	C	CIA	SEE	Total
		0	0	2	1	40	60	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes:30				Total Classes:30		
Prerequisites: Introduction to electrical engineering.								

Course Overview: This Electrical Engineering Laboratory develops practical understanding of basic circuit laws, network theorems, transient and RLC circuit behavior, resonance, waveform analysis, and power measurement using experiments and digital simulation, with open-ended tasks to strengthen analytical skills.

Course Objectives: Students will learn

1. Understand and verify the fundamental electrical laws and theorems governing DC circuits through practical experiments.
2. Develop analytical skills in applying circuit analysis methods and network theorems to determine loop currents and voltages.
3. Explore the behavior of RLC series circuits and determine their impedance and resonance characteristics using simulation.
4. Investigate the resonance conditions in parallel RLC circuits and analyze waveform parameters such as RMS and average values using simulation.
5. Measure and evaluate active and reactive power for different electrical loads through simulations.

Course Outcomes: After Completion of the Course, Students should be able to

1. Verify fundamental electrical laws and theorems such as KVL, KCL, Ohm's Law, Thevenin's and Norton's theorems through practical experiments.
2. Demonstrate network theorems by applying the Superposition theorem and mesh analysis
3. Analyze impedance and frequency response characteristics of RLC series circuits using simulation.
4. Evaluate resonance conditions and waveform parameters in RLC circuits using simulation.
5. Evaluate active and reactive power for various types of electrical loads using simulation.

From the below 12 experiments minimum 10 experiments are required to be conducted as compulsory experiments:

1. Verification of Kirchhoff's Voltage Law (KVL) and Kirchhoff's Current Law (KCL)
2. Verification of Ohm's Law
3. Verification of Thevenin's Theorem and Norton's Theorem
4. Verification of Superposition Theorem
5. Transient Response of Series RL and RC circuits for DC excitation
6. Computation and Verification of Impedance in RLC Series Circuits using digital simulation
7. Study of Resonance in Series RLC Circuit using digital simulation
8. Study of Resonance in Parallel RLC Circuit using digital simulation

9. Determination of RMS and Average values of a Sinusoidal Waveform using digital simulation
10. Measurement of Active and Reactive Power for different Loads (R and RL) using digital simulation
11. Simulate Kirchhoff's voltage law using basic series DC Circuit - 4 with resistors. Where Vs= 6 V, R1 = 100 Ω, R2 = 220 Ω, R3 = 1k Ω.
12. Simulate Kirchhoff's current law using basic parallel DC Circuits - 5 with resistors. Where Vs = 6V, R1 = 100 Ω, R2 = 220 Ω, R3 = 1k Ω.

Proposed open ended experiments:

1. Verification of current division in circuits by using digital simulation.
2. Verification of voltage division in circuits by using digital simulation.

TEXT BOOKS:

1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition, 2019.
2. MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2nd Edition, 2008.

REFERENCE BOOKS:

1. P. Ramana, M. Suryakalavathi, G.T.Chandrasheker, "Basic Electrical Engineering", S. Chand, 2nd Edition, 2019.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009
3. M. S. Sukhija, T. K. Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford, 1st Edition, 2012.
4. Abhijit Chakrabarthi, Sudipta Debnath, Chandan Kumar Chanda, "Basic Electrical Engineering", 2nd Edition, McGraw Hill, 2021.
5. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
6. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
7. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

ELECTRONIC RESOURCES:

1. **https://www.allaboutcircuits.com/textbook/**
2. **https://www.electrical4u.com/network-theorems/**
3. **https://www.electrical4u.com/mesh-analysis/**
4. **https://www.electrical4u.com/rlc-circuit/**
5. **https://archive.nptel.ac.in/courses/108/105/108105066/**

MATERIALS ONLINE:

1. Lab Manual
2. Open-ended experiments