25EESE207: Circuit Simulation Laboratory

w. e. f. Academic Year:	**2026-27**
Semester:	**B.E. 3rd (Electrical Engineering)**
Category of the Course:	**SE**
Prerequisite:	Basic knowledge of Electrical circuit laws and theorems, DC and AC circuit analysis, and fundamental concepts of electrical components
Rationale:	The laboratory develops skills in circuit modelling, result interpretation, troubleshooting, and comparison of simulated and theoretical results

Course Outcomes:

After Completion of the Course, Student will able to:

	Course Outcome (CO)	**RBT Level (Cognitive Domain)**
CO1	Understand the basic principles of Electrical Circuit, theorems and AC voltage regulators, and analyse simple circuits using PSIM.	Understand Remember
CO2	Develop and simulate single-phase and three-phase controlled circuit with different loads (R, L, C, RL, RLC) to study their performance.	Apply
CO3	Design and simulate rectifier circuits (half-wave, full-wave, single-phase, three-phase) using diodes as switches.	Apply
CO4	Analyze the output waveforms of clippers, clampers, and voltage regulator circuits to interpret voltage and current characteristics.	Analyze
CO5	Identify challenges in computer-based simulation and evaluate circuit behaviour to improve simulation accuracy.	Evaluate

Teaching and Evaluation Scheme:

Teaching Scheme					**Examination Scheme**				
L	**T**	**P**	**C**	**Hrs/Week**	**IE**	**EE**	**CIA**	**Practical**	**Total Marks**
0	0	4	2	4	0	0	30	20	50

IE: Internal Exam CIA: Continuous Internal Assessment
EE: External Exam (End Semester) Practical: Practical Exam (End Semester))

List of Practical:

Sr. NO.	Topic	Hrs
1	PSIM Introduction	2
2	Performing the series and parallel circuit	2
3	Performing the practical of KVL	2
4	Performing the practical of KCL	2
5	Performing the practical of RL Circuit	2
6	Performing the practical of RC Circuit	2
7	Performing the practical of RLC Circuit	2
8	Performing the practical of Half Wave Circuit	2
9	Performing the practical of Full Wave Circuit	2
10	Performing the practical of Super Position theorem	2
11	Performing the practical of Thevenin's theorem	2
12	Performing the practical of Norton's theorem	2
13	Performing the practical of Maximum Power Transfer theorem	2
14	Performing the practical of Reciprocity theorem	2
15	To simulate clipper circuit and To simulate clamper circuit.	2
	Total	30

Learning Resources:

1. Multimedia presentations (PPT/animations) for clear conceptual understanding.
2. Software like PSIM for working.
3. Online NPTEL/SWAYAM video for understanding and self-study.

Teaching Learning Method

- Group-teaching and learning
- Individual learning/self-study
- Inquiry-based learning
- Expeditionary learning (Real-world problems)
- Technology-based Learning
- Peer Teaching
- Learning through problem-solving

Course Outcomes Mapping:

CO No.	Course Outcome (CO)	POs/ PSOs Mapped	Cognitive Level (RBT)	Knowledge Category	Lab Sessions (Laboratory)
CO1	Understand the basic principles of Electrical Circuit, theorems and AC voltage regulators, and analyse simple circuits using PSIM.	PO1, PO2, PSO1	Understand Remember	Conceptual	6

CO2	Develop and simulate single-phase and three-phase controlled circuit with different loads (R, L, C, RL, RLC) to study their performance.	PO3, PO4, PSO1	Apply	Procedural	6
CO3	Design and simulate rectifier circuits (half-wave, full-wave, single-phase, three-phase) using diodes as switches.	PO3, PO4, PSO1	Apply	Procedural	6
CO4	Analyze the output waveforms of clippers, clampers, and voltage regulator circuits to interpret voltage and current characteristics.	PO4, PO5, PSO2	Analyze	Conceptual / Procedural	6
CO5	Identify challenges in computer-based simulation and evaluate circuit behaviour to improve simulation accuracy.	PO5, PO6, PSO2	Evaluate	Metacognitive / Procedural	6

Mapping of COs with POs & PSOs:

CO	PO											PSO	
	1	2	3	4	5	6	7	8	9	10	11	1	2
CO1	3	2	0	0	2	0	0	0	0	0	0	3	0
CO2	0	0	2	2	2	0	0	0	0	0	0	3	0
CO3	0	0	2	2	0	0	0	0	0	0	0	2	0
CO4	0	0	0	3	2	0	0	0	0	0	0	0	3
CO5	0	0	0	0	2	2	0	0	0	0	0	0	3

3: High, 2: Medium, 1: Low

Sustainable Development Goals (SDG) Integration

Mapping of the given Course Outcomes (COs) with relevant Sustainable Development Goals (SDGs) for a Simulation-based Electrical Engineering course**.** The mapping is based on how each CO contributes to sustainability, energy efficiency, innovation, and quality education

SDG Mapping with Course Outcomes

CO	Course Outcome	Relevant SDGs	Justification
CO1	Understand the basic principles of Electrical Circuit, theorems and AC voltage regulators, and analyse simple circuits using PSIM.	SDG 4 , SDG 7	Develops technical knowledge through simulation tools and builds understanding of efficient power conversion systems used in renewable energy applications.
CO2	Develop and simulate single-phase and three-phase controlled circuit with different	SDG 7 , SDG 9	Controlled converters are essential in industrial drives, renewable systems,

	loads (R, L, C, RL, RLC) to study their performance.		and efficient power management technologies.
CO3	Design and simulate rectifier circuits (half-wave, full-wave, single-phase, three-phase) using diodes as switches.	SDG 7	Rectifiers are widely used in renewable energy systems, battery charging, and efficient power supply systems.
CO4	Analyze the output waveforms of clippers, clampers, and voltage regulator circuits to interpret voltage and current characteristics.	SDG 9	Supports development of reliable electronic systems used in industrial automation and infrastructure.
CO5	Identify challenges in computer-based simulation and evaluate circuit behaviour to improve simulation accuracy.	SDG 4 , SDG 12	Simulation reduces physical resource wastage, minimizes hardware trials, and promotes efficient design practices.