25EESE207: Circuit Simulation Laboratory

w. e. f. Academic Year:	**2026-27**
Semester:	**3rd**
Category of the Course:	**SE**
Prerequisite:	Basic Electrical Engineering, Basic Electronics
Rationale:	

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**	**Theory**	**CIA**	**Practical**	**Total Marks**
0	0	4	2	4	0	0	30	20	50

IE: Internal Evaluation Theory: Theory Exam (End Semester)

CIA: Continuous Internal Assessment Practical: Practical Exam (End Semester)

List of Practical:

Sr. NO.	**Topic**	**Hrs**
1	PSIM Introduction	2
2	Performing the series and parallel circuit	
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

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks in Percentage					
Remember	Understand	Apply	Analyze	Evaluate	Create
10	10	20	30	20	10

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may very slightly from above table.

Teaching Learning Method

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

Course Outcomes Mapping:

CO No.	Course Outcome (CO)	POs/ PSOs Mapped	Cognitive Level (RBT)	Knowledge Category	Class Sessions (Lecture)
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	
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	
CO3	Design and simulate rectifier circuits (half-wave, full-wave, single-phase, three-phase) using diodes as switches.	PO3, PO4, PSO1	Apply	Procedural	
CO4	Analyze the output waveforms of clippers, clampers, and voltage regulator circuits to interpret voltage and current characteristics.	PO4, PO5, PSO2	Analyze	Conceptual / Procedural	
CO5	Identify challenges in computer-based simulation and evaluate circuit behaviour to improve simulation accuracy.	PO5, PO6, PSO2	Evaluate	Metacognitive / Procedural	

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 loads (R, L, C, RL, RLC) to study their performance.	SDG 7 , SDG 9	Controlled converters are essential in industrial drives, renewable systems, 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.