



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad -500 043

COMPUTER SCIENCE AND ENGINEERING

COURSE DESCRIPTOR

Course Title	FUNDAMENTALS OF ELECTRICAL ENGINEERING LABORATORY				
Course Code	AEEB05				
Programme	B.Tech				
Semester	I	CSE			
Course Type	Foundation				
Regulation	IARE - R18				
Course Structure	Theory			Practical	
	Lectures	Tutorials	Credits	Laboratory	Credits
	3	1	4	3	1.5
Chief Coordinator	Mr. A Naresh Kumar, Assistant Professor				
Course Faculty	Dr. M Laxmidevi Ramanaih, Associate Professor Mr. A Nareshkumar, Assistant Professor Mr. K Lingaswamy, Assistant Professor Mr. A Srikanth, Assistant Professor Mr. T Mahesh, Assistant Professor Mr. N Shivaprasad, Assistant Professor				

I. COURSE OVERVIEW:

The aim of this course is to conduct experiments on basic concepts of electrical circuits and it is further extended to cover the application of basic concepts by the inclusion of series and parallel electrical circuits. The course deals with the alternating quantities and DC machines, AC machines in power stations. This course includes experiments deal with the study of Thevenin's and Norton's theorems.

II. COURSE PRE-REQUISITES:

Level	Course Code	Semester	Prerequisites	Credits
-	-	-	-	-

III. MARKS DISTRIBUTION:

Subject	SEE Examination	CIA Examination	Total Marks
Fundamentals of Electrical Engineering Laboratory	70 Marks	30 Marks	100

IV. DELIVERY / INSTRUCTIONAL METHODOLOGIES:

✗	Chalk & Talk	✗	Quiz	✗	Assignments	✗	MOOCs
✓	LCD / PPT	✗	Seminars	✗	Mini Project	✓	Videos
✓	Open Ended Experiments						

V. EVALUATION METHODOLOGY:

Each laboratory will be evaluated for a total of 100 marks consisting of 30 marks for internal assessment and 70 marks for semester end lab examination. Out of 30 marks of internal assessment, continuous lab assessment will be done for 20 marks for the day to day performance and 10 marks for the final internal lab assessment.

Semester End Examination (SEE): The semester end lab examination for 70 marks shall be conducted by two examiners, one of them being Internal Examiner and the other being External Examiner, both nominated by the Principal from the panel of experts recommended by Chairman, BOS.

The emphasis on the experiments is broadly based on the following criteria:

20 %	To test the preparedness for the experiment.
20 %	To test the performance in the laboratory.
20 %	To test the calculations and graphs related to the concern experiment.
20 %	To test the results and the error analysis of the experiment.
20 %	To test the subject knowledge through viva – voce.

Continuous Internal Assessment (CIA):

CIA is conducted for a total of 30 marks (Table 1), with 20 marks for continuous lab assessment during day to day performance, 10 marks for final internal lab assessment.

Table 1: Assessment pattern for CIA

Component	Laboratory		Total Marks
	Day to day performance	Final internal lab assessment	
CIA Marks	20	10	30

Continuous Internal Examination (CIE):

One CIE exams shall be conducted at the end of the 16th week of the semester. The CIE exam is conducted for 10 marks of 3 hours duration.

Preparation	Performance	Calculations and Graph	Results and Error Analysis	Viva	Total
2	2	2	2	2	10

VI. HOW PROGRAM OUTCOMES ARE ASSESSED:

Program Outcomes (POs)		Strength	Proficiency assessed by
PO 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	3	Calculations of the observations
PO 2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	3	Characteristic curves
PO 3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	2	Discussion
PO 4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	2	Term observations

3 = High; 2 = Medium; 1 = Low

VII. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

Program Specific Outcomes (PSOs)		Strength	Proficiency assessed by
PSO 1	Professional Skills: The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	2	Presentation on real-world problems
PSO 2	Software Engineering Practices: The ability to apply standard practices and strategies in software service management using open-ended programming environments with agility to deliver a quality service for business success.	2	Discussion
PSO 3	Successful Career and Entrepreneurship: The ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	1	Presentation on real-world problems

3 = High; 2 = Medium; 1 = Low

VIII. COURSE OBJECTIVES (COs):

The course should enable the students to:	
I	Examine the basic laws and network reduction techniques
II	Measure impedance of series RL, RC and RLC circuits
III	Prove the various theorems used to reduce the complexity of electrical network

IX. COURSE LEARNING OUTCOMES (CLOs):

CLO Code	CLO's	At the end of the course, the student will have the ability to:	PO's Mapped	Strength of Mapping
AEEB05.01	CLO 1	Understand the application of basic concept of electrical circuits KCL and KVL in series and parallel circuits.	PO 1,PO 2	2
AEEB05.02	CLO 2	Understand the basic concept of electrical circuits Ohm's law.	PO 1,PO 2	2
AEEB05.03	CLO 3	Summarize the procedure of mesh analysis.	PO 1	3
AEEB05.04	CLO 4	Summarize the procedure of nodal analysis.	PO 1, PO 4	3
AEEB05.05	CLO 5	List out various alternating quantities such as Sinusoidal AC voltage, average and RMS values, form and peak factor, and understand concept of three phase alternating quantity.	PO 1, PO 4	3
AEEB05.06	CLO 6	Interpret the alternating quantities with its instantaneous, average and root mean square values.	PO 1, PO 4	2
AEEB05.07	CLO 7	Illustrate the concept of impedance, reactance, admittance, susceptance and conductance.	PO 1,PO 2	2
AEEB05.08	CLO 8	Analyze the steady state behavior of R, L and C elements with sinusoidal excitation.	PO 1, PO 4	1
AEEB05.09	CLO 9	Analyze the steady state behavior of series and parallel RL and RC circuits with sinusoidal excitation.	PO 1, PO 4	1
AEEB05.10	CLO 10	Analyze the steady state behavior of series and parallel RLC circuits with sinusoidal excitation.	PO 1	3
AEEB05.11	CLO 11	Interpret the power factor in single phase AC circuits.	PO 1	3
AEEB05.12	CLO 12	Apply network reduction techniques to calculate unknown quantities associated with electrical circuits.	PO 1, PO 4	2
AEEB05.13	CLO 13	Summarize the procedure of Thevinins theorem.	PO 1, PO 4	2
AEEB05.14	CLO 14	Summarize the procedure of Norton's theorem.	PO 1	2

3 = High; 2 = Medium; 1 = Low

X. MAPPING COURSE LEARNING OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Learning Outcomes (CLOs)	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO 1	2	2												2	1
CLO 2	2	2												2	
CLO 3	3												1		
CLO 4	1			3										1	
CLO 5	1			3										1	
CLO 6	1			2											
CLO 7	1	2													
CLO 8	1			1											
CLO 9	1			1											
CLO 10	3													1	
CLO 11	3													1	
CLO 12	1			2											
CLO 13	1			2											
CLO 14	2														

3 = High; 2 = Medium; 1 = Low

XI. ASSESSMENT METHODOLOGIES – DIRECT

CIE Exams	PO 1, PO 2 PO 4	SEE Exams	PO 1, PO 2 PO 4	Assignments	-	Seminars	-
Laboratory Practices	PO 1, PO 2 PO 4, PSO 2	Student Viva	PO 1	Mini Project	-	Certification	-

XII. ASSESSMENT METHODOLOGIES - INDIRECT

✓	Early Semester Feedback	✓	End Semester OBE Feedback
✗	Assessment of Mini Projects by Experts		

XIII. SYLLABUS

LIST OF EXPERIMENTS	
Week-1	OHM'S LAW , KIRCHHOFF'S CURRENT LAW AND VOLTAGE LAW
Verification of ohm's law, Kirchhoff's current and voltage laws using hardware and digital simulation.	

Week-2	VOLT – AMPHERE METHOD
Determination of unknown resistance and its temperature dependency.	
Week-3	MESH ANALYSIS
Determination of mesh currents using hardware and digital simulation.	
Week-4	NODAL ANALYSIS
Measurement of nodal voltages using hardware and digital simulation.	
Week-5	SINGLE PHASE AC CIRCUITS
Calculation of average value, RMS value, form factor, peak factor of sinusoidal wave.	
Week-6	IMPEDANCE OF SERIES RL CIRCUIT
Examine the impedance of series RL Circuit	
Week-7	IMPEDANCE OF SERIES RC CIRCUIT
Measure the impedance of series RC Circuit	
Week-8	IMPEDANCE OF SERIES RLC CIRCUIT
Calculate the impedance of series RLC Circuit	
Week-9	MEASUREMENT OF POWER CONSUMED BY A FLUORESCENT LAMP
To obtain power consumed and power factor of a fluorescent lamp, operated at different voltages.	
Week-10	CHOKE COIL PARAMETERS
Determination of internal resistance and inductance of choke coil.	
Week-11	THEVENIN'S THEOREM
Reform conversion of complex network into simple series circuit.	
Week-12	NORTON'S THEOREM
Reform conversion of complex network into simple parallel circuit.	

XIV. COURSE PLAN:

The course plan is meant as a guideline. Probably there may be changes.

Week No.	Topics to be covered	Course Learning Outcomes (CLOs)	Reference
1	Understand the application of basic concept of electrical circuits KCL and KVL in series and parallel circuits.	CLO 1	T2:1.12 & 2.6 R2:1.7,1.8&1.14

Week No.	Topics to be covered	Course Learning Outcomes (CLOs)	Reference
2	Understand the basic concept of electrical circuits Ohm's law.	CLO 2	T2:1.9 R2:1.5
3	Summarize the procedure of mesh analysis.	CLO 3	T2: 7.6.3 R2:5.10,5.11,5.12
4	Summarize the procedure of nodal analysis.	CLO 4	T2: 7.7.6 R2:5.21,5.22,5.23
5	List out various alternating quantities such as Sinusoidal AC voltage, average and RMS values, form and peak factor, and understand concept of three phase alternating quantity.	CLO 5	T2: 6.9-6.10 R2:6.13&6.15
6	Interpret the alternating quantities with its instantaneous, average and root mean square values.	CLO 6	T2: 9.3.1 R2:7.8
7	Illustrate the concept of impedance, reactance, admittance, susceptance and conductance.	CLO 7	T2: 8.8 R2:7.21
8	Analyze the steady state behavior of R, L and C elements with sinusoidal excitation.	CLO 8	T4: 4.11 R2:8.1
9	Analyze the steady state behavior of series and parallel RL and RC circuits with sinusoidal excitation.	CLO 9	T4:4.19,5.2 R2:8.22,5
10	Analyze the steady state behavior of series and parallel RLC circuits with sinusoidal excitation.	CLO 10	T4: 4.23 R2:8.8,8.17,
11	Interpret the power factor in single phase AC circuits.	CLO 11	T4: 4.23 R2:8.8,8.18
12	Apply network reduction techniques to calculate unknown quantities associated with electrical circuits.	CLO 12	T4: 6.6 R2:9.21,9.22,9.23
13	Summarize the procedure of Thevenin's theorem.	CLO 13	T4: 6.6 R2:9.21,9.22,9.23
14	Summarize the procedure of Norton's theorem.	CLO 14	R2: 2.2-2.6

XV. GAPS IN THE SYLLABUS - TO MEET INDUSTRY / PROFESSION REQUIREMENTS:

S No	Description	Proposed actions	Relevance with POs	Relevance with PSOs
1	To improve standards and analyze the concepts.	Seminars	PO 1, PO 4	PSO 1
2	Encourage students to solve real time applications and prepare towards competitive examinations.	NPTEL	PO 2	PSO 1

Prepared by:

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