



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad -500 043

ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE DESCRIPTOR

Course Title	NETWORK ANALYSIS LABORATORY				
Course Code	AEEB12				
Programme	B.Tech				
Semester	III	EEE			
Course Type	Core				
Regulation	IARE - R18				
Course Structure	Theory			Practical	
	Lectures	Tutorials	Credits	Laboratory	Credits
	3	1	4	3	1
Chief Coordinator	Ms. S Swathi, Assistant Professor, EEE				
Course Faculty	Dr. D Shobha Rani, Professor, EEE Ms. S Swathi, Assistant Professor, EEE				

I. COURSE OVERVIEW:

This course introduces the basic concepts of network theory which is the foundation for all subjects of the electrical engineering discipline. The emphasis of this course is laid on the basic analysis of circuits with network theorems for both DC and AC excitation. The course also includes transient analysis of DC and AC circuits, network functions, and two port network parameters, locus diagrams, design and analysis of filters.

II. COURSE PRE-REQUISITES:

Level	Course Code	Semester	Prerequisites	Credits
UG	AHB02	I	Linear Algebra and Calculus	4
UG	AHSB11	II	Mathematical Transform Techniques	4
UG	AEB002	II	Electrical Circuits	4

III. MARKS DISTRIBUTION:

Subject	SEE Examination	CIA Examination	Total Marks
Electrical Engineering Simulation Lab	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
PO1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	2	Calculations of the observations
PO2	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	Exercise, Discussion
PO3	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.	3	Term observations
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	2	Exercise, Discussion

3 = High; 2 = Medium; 1 = Low

VII. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

Program Specific Outcomes		Level	Proficiency assessed by
PSO1	Problem Solving Skills: Able to utilize the knowledge of high voltage engineering in collaboration with power systems in innovative, dynamic and challenging environment, for the research based team work.	3	Exercise, Discussion
PSO2	Professional Skills: To explore the scientific theories, ideas, methodologies and the new cutting edge technologies in renewable energy engineering, and use this erudition in their professional development and gain sufficient competence to solve the current and future energy problems universally.	--	--
PSO3	Modern Tools in Electrical Engineering: To be able to utilize of technologies like PLC, PMC, process controllers, transducers and HMI and design, install, test, and maintain power systems and industrial applications.	2	videos

3 = High; 2 = Medium; 1 = Low

VIII. COURSE OBJECTIVES (COs):

The course should enable the students to:	
I	Apply network theorems to obtain the equivalent circuit of electrical networks.
II	Calculate two port network parameters of different electrical circuits
III	Examine the circuit modeling in frequency domain
IV	Understand the virtual instrumentation using Lab VIEW

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
AEEB12.01	CLO 1	Apply the network reduction techniques directly and indirectly to calculate quantities associated with electrical circuit	PO1, PO2	3
AEEB12.02	CLO 2	Prove the law of conservation of energy, superposition principle, reciprocity and maximum power transfer condition for the electrical network with DC excitation.	PO1,PO2	2
AEEB12.03	CLO 3	Summarize the procedure of Thevenin's, Norton's and Milliman's theorems to reduce complex network into simple equivalent network	PO1,PO2	2
AEEB12.04	CLO 4	Calculate Z, Y of two port network	PO1, PO2,PO3	3
AEEB12.05	CLO 5	Determine ABCD, H parameters of the two port network	PO1, PO2,PO3	3
AEEB12.06	CLO 6	Editing and building a VI, creating a sub VI.	PO5	2
AEEB12.07	CLO 7	Generate signals of triangular wave, saw tooth, square wave and display of wave form, minimum and maximum values of wave form and modulation..	PO1,PO5	2
AEEB12.08	CLO 8	Measure of Frequency using Lissajous figures in LabView.	PO1, PO2,PO5	2
AEEB12.09	CLO 9	Analyze VIs using FOR loop, WHILE loop, charts and arrays, graph and.	PO1, PO2,PO5	2
AEEB12.10	CLO 10	Relate various two port parameters and inter relationships between them	PO1,PO2	2
AEEB12.11	CLO 11	Apply source transformation technique to determine equivalent resistance and source current.	PO1,PO2	2
AEEB12.12	CLO 12	Design of electrical network in frequency domain using digital simulation.	PO1, PO2,PO5	2
AEEB12.13	CLO 13	Explore the knowledge and skills of employability to succeed in national and international level competitive examinations	PO1,PO2,PO3	2

X. MAPPING COURSE LEARNING OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC 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	3	3											3		
CLO 2	3	2											2		
CLO 3	2	3											3		
CLO 4	2	3											3		
CLO 5	2	3			2								2		2

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

3 = High; 2 = Medium; 1 = Low

XI. ASSESSMENT METHODOLOGIES – DIRECT:

CIE Exams	PO1, PO2, PO3, PO5	SEE Exams	PO1, PO2, PO3, PO5	Assignments	PO1, PO2, PO3, PO5	Seminars	PO1, PO2, PO3, PO5
Laboratory Practices	PO1, PO2, PO3, PO5	Student Viva	--	Mini Project	--	Certification	-
Term Paper	-						

XII. ASSESSMENT METHODOLOGIES – INDIRECT:

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

XIII. SYLLABUS :

LIST OF EXERCISES	
Expt. 1	MESH AND NODAL ANALYSIS
Verification of mesh and nodal analysis using hardware.	
Expt. 2	SUPERPOSITION AND RECIPROCITY THEOREMS
Verification of super position and reciprocity theorems using hardware.	
Expt. 3	MAXIMUM POWER TRANSFER THEOREM
Verification of maximum power transfer theorem using hardware.	
Expt. 4	THEVENIN'S AND NORTON'S THEOREMS

Verification of Thevenin's and Norton's theorems using hardware.	
Expt. 5	COMPENSATION AND MILLIMAN'S THEOREM
Verification of compensation and Milliman's theorems using hardware.	
Expt. 6	IMPEDANCE (Z) AND ADMITTANCE (Y) PARAMETERS
To calculate and verify 'Z' parameters and 'Y' parameters of two-port network	
Expt. 7	TRANSMISSION (ABCD) AND HYBRID (H) PARAMETERS
To calculate and verify 'ABCD' parameters and 'H' parameters of two-port network.	
Expt. 8	VIRTUAL INSTRUMENTS (VI) USING LABVIEW
Editing and building a VI, creating a sub VI.	
Expt. 9	GENERATION OF COMMON WAVE FORMS USING LABVIEW
Signal generation of triangular wave; saw tooth, square wave and display of wave form, minimum and maximum values of wave form and modulation.	
Expt.10	FREQUENCY MEASUREMENT USING LABVIEW
Frequency measurement using Lissajous figures in Lab View.	
Expt. 11	STRUCTURES USING LABVIEW
Using FOR loop, WHILE loop, charts and arrays, graph and analysis VIs.	
Expt. 12	SERIES, PARALLEL AND CASCADE CONNECTION OF TWO PORT NETWORK
To determine the equivalent parameters of series, parallel, cascade connection of two port network.	
Expt. 13	SOURCE TRANSFORMATION
Analysis of given circuit using source transformation technique	
Expt. 14	SERIES RESONANCE
Verification of series resonance using hard ware .	
TEXT BOOKS:	
1. A Chakrabarthy, "Electric Circuits", Dhanpat Rai& Sons, 6 th Edition, 2010.	
2.A Sudhakar, Shyammohan S Palli, "Circuits & Networks", Tata McGraw- Hill, 4 th Edition, 2010.	
3. Rudrapratap, "Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers",Oxford University Press, 1 st Edition, 1999.	
4. Nesimiertugrul, "Labview for electric circuits, machines, drives, and laboratories", prentice hall, 1 st Edition, 2002.	
REFERENCES:	
1. Department Lab Manual.	
2. A Chakrabarti, "Circuit Theory", Dhanpat Rai Publications, 6 th Edition, 2006.	
3. V K Mehta, Rohit Mehta, "Principles of Electrical Machines", 1 st Edition, 2013.	
4. I J Nagarath & D P Kothari, "Electrical Machines", 1 st Edition, 2011	

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	Verification of mesh and nodal analysis using hardware.	CLO1	T2: 9.11 R2:19.8
2	Verification of super position and reciprocity theorems using hardware.	CLO2	T2 : 8.13 R2:15.12
3	Verification of maximum power transfer theorem using hardware.	CLO2	T1 :13.6 R2:16.4
4	Verification of Thevenin's and Norton's theorems using hardware.	CLO3	T1 :13.9 R2:16.5
5	Verification of compensation and Milliman's theorems using hardware.	CLO2	T2 :12.1 R2:14.5
6	To calculate and verify 'Z' parameters and 'Y' parameters of two-port network	CLO4	T2 :12.4 R2:14.6
7	To calculate and verify 'ABCD' parameters and 'H' parameters of two-port network	CLO5	T2 :11.2 R2 :17.3
8	Editing and building a VI, creating a sub VI.	CLO6	T1: 18.9 R2:19.15
9	Signal generation of triangular wave; saw tooth, square wave and display of wave form, minimum and maximum values of wave form and modulation.	CLO7	T2:12.4 R2:14.7
10	Frequency measurement using Lissajous figures in Lab View.	CLO8	T2:12.8 R2:14.9
11	Using FOR loop, WHILE loop, charts and arrays, graph and analysis VIs.	CLO9	T2:12.4 R2:14.8
12	To determine the equivalent parameters of series, parallel, cascade connection of two port network	CLO10	T2 :12.4 R2:14.6
13	Analysis of given circuit using source transformation technique	CLO11	T2:12.6 R2:14.8
14	Verification of series resonance using hard ware.	CLO12	T2:12.8 R2:14.9

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

S No	Description	Proposed Actions	Relevance With POs	Relevance With PSOs
1	Designing of prototype Filters	Guest Lectures	PO1,PO2, PO5	PSO 1
2	Digital Simulation of Electric Circuits.	Videos	PO1, PO3, PO5	PSO 1
3	Significance of Poles and Zeros.	Term Paper	PO1, PO2	PSO 1

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