ELECTRICAL ENGINEERING SIMULATION LABORATORY

III Semester: EEE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AEE105	**Core**	-	-	3	2	30	70	100
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 42**				**Total Classes: 42**		

I. COURSE OVERVIEW:

The Electrical Engineering Simulation Laboratory is designed to give hands-on experience on virtual instrumentation through digital simulation techniques. The emphasis of this course is laid on the basic analysis of circuits which includes three phase circuits, transient analysis of DC and AC circuits, network functions, and two port net work parameters, Fourier analysis of AC circuits, design and analysis of filters.

II. OBJECTIVES:

The course should enable the students to:

I	Measure the active and reactive power in a three phase system.
II	Two port network parameters of different electrical circuits.
III	Time varying characteristics of series and parallel circuits using MATLAB.
IV	Design the low pass and high pass filters and Analyse the basic circuits, waveforms using Fourier transform, Lab VIEW, Visio Software.

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

CO 1	**Calculate** various parameters of two port network for analyzing different electrical circuits.	Apply
CO 2	**Examine** the transfer function for studying transient response of RL, RC and RLC circuits.	Understand
CO 3	**Analyze** the virtual instrumentation (VI) using control loops, arrays, charts and graphs.	Analyze
CO 4	**Determine** various alternating quantities of single phase and three phase signals.	Apply
CO 5	**Analyze** the basic circuits, rectified waveforms using Fourier transform and Visio Software.	Analyze

IV. SYLLABUS:

LIST OF EXPERIMENTS	
Expt. 1	**MEASUREMENT OF THREE PHASE ACTIVE POWER AND REACTIVE POWER**
Measurement of three phase active and reactive power for balanced and unbalanced loads.	
Expt. 2	**LOCUS DIAGRAMS**
Plot the locus diagram of series RL and RC circuits.	
Expt. 3	**IMPEDANCE(Z) AND ADMITTANCE(Y) PARAMETERS**
To calculate and verify 'Z' parameters and 'Y' parameters of two-port network.	

Expt. 4	**TRANSMISSION (ABCD) AND HYBRID(H) PARAMETERS**
To calculate and verify 'ABCD' parameters and 'H' parameters of two-port network.	
Expt. 5	**FOURIER ANALYSIS**
Fourier analysis of square wave, half wave rectified and full wave rectified sine wave using MATLAB.	
Expt. 6	**ELECTRICAL SYMBOLS USING VISSIO SOFTWARE**
Draw the electrical symbols using VISSIO software.	
Expt. 7	**TRANSIENT RESPONSE OF ELECTRICAL CIRCUITS USING DIGITAL SIMULATION**
To study and plot the transient response of series and parallel RL and RC circuits using MATLAB.	
Expt. 8	**TRANSIENT RESPONSE OF ELECTRICAL CIRCUITS USING DIGITAL SIMULATION**
To study and plot the transient response of series and parallel RLC circuit using MATLAB.	
Expt. 9	**DESIGN OF LOW PASS AND HIGH PASS FILTERS USING DIGITAL SIMULATION**
Simulation of low pass and high pass filters using digital simulation.	
Expt. 10	**VIRTUAL INSTRUMENTS (VI) USING LabVIEW**
Editing and building a VI, creating a sub VI.	
Expt. 11	**STRUCTURES USING LabVIEW**
Using FOR loop, WHILE loop, charts and arrays, graph and analysis VIs.	
Expt. 12	**GENERATION OF COMMON WAVE FORMS USING LabVIEW**
Signal generation of sine wave, triangular wave; saw tooth, square wave and display of wave form, minimum and maximum values of wave form and modulation.	
Expt. 13	**SINE WAVE GENERATION USING LabVIEW**
Three phase sine wave generation and display.	
Expt. 14	**FREQUENCY MEASUREMENT USING LabVIEW**
Frequency measurement using Lissajous figures in LabVIEW.	

Reference Books:

1. B R Gupta, Vandana Singhal, "Fundamentals of Electrical Machines", New Age International Publishers, 1st Edition, 2010.
2. A Sudhakar, Shyammohan S Palli, "Circuits & Networks", Tata McGraw- Hill, 4th Edition, 2010.
3. P S Bimbhra, "Electrical Machines", Khanna Publishers, 2nd Edition, 2008.
4. Nesimi Ertugrul, "LabVIEW for Electric Circuits, Machines, Drives, and Laboratories", Prentice Hall, 1st Edition, 2002.
5. Gupta, Gupta & John, "Virtual Instrumentation Using LabVIEW", Tata McGraw-Hill, 1st Edition, 2005.

SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:

SOFTWARE: MATLAB R2015a and LabVIEW

HARDWARE: Desktop Computers (04 nos)

LIST OF EQUIPMENT REQUIRED FOR A BATCH OF 36 STUDENTS:

S. No	Name of the Equipment	Range
1	Regulated Power Supply	0-30V DC
2	Cathode Ray Oscilloscope	0-20 MHz
3	Digital voltmeter	0-20 V
4	Digital ammeter	0-200 mA
5	Resistors	100 No.s (47 Ω, 82 Ω, 100 Ω, 150 Ω, 220 Ω, 470 Ω, 560 Ω, 1k Ω, 2.2k Ω, 3.3k Ω, 5k Ω,10k Ω)
6	Inductors	0.01 mH, 0.1 mH,10 mH, 50 mH
7	Capacitors	0.01 μF, 0.1 μF, 0.47 μF, 470 μF, 33 μF
8	1-ϕ Transformer	3 KVA, 115 / 230V
9	1-ϕ Auto Transformer	230 / 0-270V, 10A
10	Ammeter	0-2.5 / 5A, MI
11	Ammeter	0-10 / 20 A, MI
12	Voltmeter	0-150 / 300V, MI
13	Voltmeter	0-300 / 600V, MI
14	Wattmeter	5 / 10A,75 / 150 / 300V, LPF
15	Wattmeter	10 / 20A,150 / 300 / 600V, UPF
16	Multimeter	10 No.s
17	Bread boards	30 No.s
18	Probes / Connecting wires	400 No.s