INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

ELECTRICAL NETWORKS AND SIMULATION LABORATORY								
III Semester: EEE								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
AEED08	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		-	-	2	1	40	60	100
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 45**				**Total Classes: 45**		
Prerequisite: Electrical Circuits, Linear Algebra and Calculus								

I. COURSE OVERVIEW:
The Network Analysis and Scientific Computing Laboratory is designed to give hands-on experience on virtual instrumentation through digital simulation techniques. These techniques enable the students in examining characteristics of DC and AC circuits, filters, solution of differential equation, generation of three phase and complex wave forms using MATLAB.

II. COURSES OBJECTIVES:
The students will try to learn

I. Time varying characteristics of series and parallel circuits using MATLAB.
II. Transfer function of electrical circuits using MATLAB.
III. Relations between electrical quantities in complex electrical networks using MATLAB.
IV. The performance of single phase and three phase circuits using Lab View.

III. COURSE OUTCOMES:
At the end of the course students should be able to:

CO 1 Identify the symbols, tool kits and connections in Simulink environment for computing the quantities associated with electrical circuits
CO 2 Examine the transfer function for studying transient response of RL, RC and RLC circuits.
CO 3 Analyze the virtual instrumentation (VI) using control loops, arrays, charts and graphs
CO 4 Determine various alternating quantities of single phase and three phase signals generated in MATLAB/ LabVIEW.
CO 5 Exam Design the various sensors for measuring electrical and non-electrical quantities through digital simulation.

IV. COURSE CONTENT:

Week – 1: Introduction to MATLAB
Check the symbols, tool kits and connections related to electrical circuits in MATLAB

Week – 2: Transient Response of Series RL, RC and RLC Circuits
Plot the time varying characteristics of series circuits using MATLAB

Week – 3: Solving Differential Equations
Obtain the solution of differential equation representing electric network using MATLAB

Week – 4: Transfer Function of Electrical Circuit
Determine the transfer function of electrical circuit using MATLAB

Week – 5: Transient Response Of Parallel RL , RC And RLC Circuits
Plot the time varying characteristics of parallel circuits using MATLAB

Week – 6: Generation of Three Phase Wave Form
Generate the three phase AC wave form for different phase differences and phase sequences using MATLAB

Week – 7: Three phase measurements
Determine the electrical quantities of three phase wave form using MATLAB

Week – 8: Virtual instruments (vi) using LabVIEW
Editing and building a VI, creating a sub VI

Week – 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

Week – 10: Frequency measurement using Lissajous figures in Lab View
Measure the frequency of unknown signal using Lissajious pattern in LAB View

Week – 11: Structures Using LabVIEW
Using FOR loop, WHILE loop, charts and arrays, graph and analysis VIs.

Week – 12: Simulation of low pass and high pass filters using digital simulation
Plot the characteristics of low pass and high pass filters using MATLAB

Week – 13: Sensor Circuit Using LAB View
Design the electric and electronic circuit of sensor using LAB View

Week – 14: Proximity Sensor Using LAB View
Measure the speed of the machine with proximity sensor in LAB View.

V. REFERENCE BOOKS:

1. A Chakrabarti, "Circuit Theory", Dhanpat Rai Publications, 6th edition, 2006.
2. William Hayt, Jack E Kemmerly S.M. Durbin, "Engineering Circuit Analysis", Tata McGraw Hill, 7th edition, 2010.
3. K S Suresh Kumar, "Electric Circuit Analysis", Pearson Education, 1st edition, 2013.

VI. ELECRONIC RESOURCES:

1. https://www.ee.iitkgp.ac.in
2. https://www.iare.ac.in/

VIII. MATERIALS ONLINE:

1. Course template
2. Lab Manual