**2 / 4 B. Tech THIRD SEMESTER**

**EM3L2 CIRCUITS AND SYSTEMS SIMULATION LAB Credits: 2**

**Lecture: - periods/week** **Internal assessment: 25 marks**
**Lab Practice: 3hrs/week** **Semester end examination: 50 marks**

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**Course Objectives:**

- To familiarize the students in using Multisim software tool
- To know the measurement of various parameters like voltage , current , power
- Usage of MATLAB software in engineering applications.

**Learning Outcomes:**

At the end of this course, the Student will be able to

- Constrcuct a circuit and simulate to verify KCL,KVL using Multisim tool.
- Constrcuct a circuit and simulate to verify current division, voltage division using Multisim tool.
- Constrcuct a circuit and simulate to verify super position , Thevinin's Theorems using Multisim tool.
- Generate standard signals and sequences using MATLAB software tool.
- Perform operations on signals & sequences like addition , shifting ,folding etc.
- Compute energy, power of given signal.
- Compute auto, cross correlation of signals .
- Verify Linearity, Time invariance properties of a given CTS/DTS using MATLAB.

**LIST OF EXPERIMENTS:**

**PART-A: CIRCUITS SIMULATION USING MULTISIM**

1. An Introduction to Electrical Circuits Simulation using Multisim Workbench:
2. Resistors in Series, Color Codes & Power Rating
3. Kirchhoff's Laws
4. Series & Parallel Circuits, Voltage Divider & Current Divider Rules
5. Superposition Theorem
6. Thevenin's Theorem and Maximum Power Transfer
7. Transients of a First Order RC Circuit
8. The Oscilloscope and Function Generator
9. Sinusoidal AC Analysis

**PART-B: SYSTEMS SIMULATION USING MATLAB**

1. Generation of Various Signals and Sequences (periodic & Aperiodic), Such as Unit Impulse, Units step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc function
2. Operations on signals and Sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of energy and Average Power.
3. Convolution Auto Correlation and Cross Correlation of signals.
4. Verification of Linearity and Time Invariance properties of a given CTS / DTS.
5. Computation of Unit Sample, Unit Step, Sinusoidal Responses of given LTI System
6. Finding the Fourier Transform of given signal and plotting its magnitude and phase spectrum.
7. Locating Poles and Zeros, and plotting the pole zero maps in s-plane and Z-plane for a given Transfer Function