2/4 B.Tech - THIRD SEMESTER

EC3L1 **Basic Simulation Lab** **Credits: 2**

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

Course Objectives:

The objective of this laboratory is

- To introduce MATLAB and use it as a computation and visualization tool in the study of Signals & Systems and Probability theory & Stochastic process.
- An introduction to MATLAB is first given to provide the students with the foundation they need in this lab.
- Students will then be exposed to the applications of MATLAB to signal analysis and system design.

Learning Outcomes:

Student will be able to

- Analyze various types of signals and sequences.
- Apply convolution and correlation operations on different signals.
- Determine the response of an LTI system to given signals.
- Plot the spectrum of a given signal using MATLAB.
- Verify the Sampling theorem.
- Synthesize Laplace transform and able to locate poles and zeros of a system.
- Compute various statistical properties of a random noise and verify whether it is stationary.

NOTE: Minimum of 10 experiments has to be performed and recorded by the candidate to attain eligibility for External Practical Examination.

List of Experiments:

1. Basic Operations on Matrices.
2. Generation of Various Signals and Sequences such as Unit impulse, Unit step, Square, Triangular, Sinusoidal, Ramp and Sinc functions.
3. Operations on Signals and Sequences such as Addition, Multiplication, Scaling, Shifting and Folding.
4. Finding Even and Odd Parts of a Signal or Sequence.
5. Verification of Linearity and Time Invariance properties of a given Continuous / Discrete-time system.
6. Convolution of Signals and Sequences.
7. Auto Correlation and Cross Correlation of Signals and Sequences.
8. Computation of Unit Sample and Unit Step Response of given LTI System.
9. Find the Fourier Transform of a given signal and plot its magnitude and phase spectrum.
10. Wave form synthesis using Laplace Transform.

11. Locating Poles and Zeros and obtain the pole-zero plot in S-plane for a given transfer function.
12. Generation of Gaussian Noise, Computation of its Mean, Mean Square values and its Skew, Kurtosis and PSD.
13. Verification of Sampling Theorem.
14. Removal of noise by autocorrelation/ cross correlation in a given signal corrupted by noise.
15. Checking a Random Process for Wide Sense Stationarity.