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| **ECL3502** | **Signals and Systems Analysis Lab** | **L-T-P: 0-0-3; Total 12 Sessions** |

**Prerequisite**

* Basic OCTAVE / MATLAB/SCI-LAB programming.

**COURSE OBJECTIVE**

Familiarization with Signal processing system design and implementation techniques to process and analyze signals and systems to perform useful operations such as frequency domain representation signal enhancement, signal filtering, feature extraction etc.

**List of Experiments of Signals and Systems Lab**

**Experiment No 01**: Familiarizing with MATLAB/OCTAVE/SCI-LAB.

**Experiment No 02**: To generate basic signals such as impulse, unit step, exponential and sinusoidal signals in continuous and discrete-time domains using MATLAB/OCTAVE/ SCI-LAB.

Experiment No 03: Implement the signal modification techniques like time scaling, time shifting, multiplication, amplitude scaling for a given continuous and discret-time signals using MATLAB/OCTAVE/ SCI-LAB.

Experiment No 04: To determine the impulse and step response of a system given the difference equation or differential equation. Determine whether the system is linear, time invariant and stable from the impulse or step response.

# Experiment No 05: To implement convolution sum and integration given the impulse response and input signal in MATLAB/OCTAVE/SCI-LAB. Find the auto correlation and cross correlation for given signals. Implement correlation from convolution sum/integration.

# Experiment No 06: Find the spectral components of a given signal using Fourier series and Fourier transform. Study the nature of the transformation when the signal is:

I. real and periodic

ii. real and aperiodic

Check whether the Parseval’s relation holds or not.

# Experiment No 07: Find the Laplace transform of a continuous time signal along with the poles-zero plot . Comment on the nature of the signal/system such as stability, causality from the pole zero plot. Show that, Laplace transform converges to Fourier transform when evaluated on the Imaginary axis.

# Experiment No 08: Find the Z-transform of a discrete-time signal along with the pole-zero plot. Comment on the nature of the signal/system such as stability, causality from the pole-zero plot. Show that, Z-transform converges to Fourier transform when evaluated on the unit circle.

**Reference Books**

1. Octave Documentation /MATLAB Basic math and signal processing tool box documentation

**COURSE OUTCOMES**

Students would be able to :

CO1: Explore the various properties of signals and system.

CO2: Deal with characterization of Linear Shift Invariant Systems, convolution and Fourier Transform, the Sampling theorem.

CO3: Understanding of Z-Transform, discrete Fourier transform and Laplace transform.

CO4: The Lab course is useful in understanding further courses which deal with control systems, communication systems, power systems, digital signal processing.

CO5: The concepts implemented in this course are also useful to students of other disciplines like mechanical, chemical, aerospace and other branches of engineering and science