SIGNALS AND SYSTEMS LABORATORY

IV Semester: ECE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
AECB17	**Core**	0	0	2	1	30	70	100
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 24**				**Total Classes: 24**		

OBJECTIVES:

The course should enable the students to:

I.   Understand the basics of MATLAB.
II. Simulate the generation of signals and operations on them.
III. Illustrate Gibbs phenomenon.
IV. Analyze the signals using Fourier, Laplace and Z transforms.

COURSE OUTCOMES:

The student will have the ability to:

CO 1: Understand the applications of MATLAB and to generate matrices of various dimensions.

CO 2: Generate the various signals and sequences and perform operations on signals.

CO 3: Obtain the frequency domain representation of signals and sequences using Fourier transform, Laplace and z-transform.

CO 4: Understand the concept of convolution and correlation.

CO 5: Generation of various types of noise and measuring various characteristics of noise

COURSE LEARNING OUTCOMES:

1. Understand Basics of MATLAB syntax, functions and programming.

2. Analyze the generation Various Signals and Sequences in MATLAB.

3. Perform various operations on the signals including Time shifting, Scaling, Reversal, Amplitude Scaling.

4. Compute the Fourier Transform of a given signal and plotting its magnitude and phase spectrum.

5. Determine the Convolution between Signals and sequences.

6. Determine the Correlation between Signals and sequences.

7. Verification of Weiner-Khinchine Relations i.e. Auto Correlation and Power Spectral Density forms Fourier transform pair.

8. Verification of time shifting and time reversal properties of Fourier Transform.

9. Remember for Locating the Zeros and Poles and plotting the Pole-Zero maps Z-Plane for the given transfer function.

10. Draw Distribution and density functions of standard random variables.

11. Verify Gibbs Phenomenon and understand the concept of fourier series of a signal.

12. Generation of Gaussian noise (Real and Complex), Computation of its mean, M.S. Value and its Skew.

13. Analyze and synthesize different signals for a wide application range

LIST OF EXPERIMENTS
WEEK - 1   **BASIC OPERATIONS ON MATRICES**
Review basic operations on matrices by using MATLAB
WEEK-2   **GENERATIN OF VARIOUS SIGNALS AND SEQUENCE**
Generation of various signals and sequences such as unit impulse, sinc, Gaussian, exponential, saw tooth, triangular, sinusoidal by using MATLAB.
WEEK-3   **OPERATION ON SIGNALS AND SEQUENCES**
Operation on signals and sequences such as addition, subtraction, multiplication, scaling, shifting, folding by using MATLAB
WEEK -4   **GIBBS PHENOMENON**
Verification of Gibbs phenomenon by using MATLAB
WEEK -5   **FOURIER TRANSFORMS AND INVERSE FOURIER TRANSFORM**
Finding the Fourier Transform and inverse Fourier transform of a given signal/sequence and plotting its magnitude and phase spectrum by using MATLAB.
WEEK -6   **PROPERTIES OF FOURIER TRANSFORMS**
Verifying Time shifting and scaling, time and differentiation properties of Fourier transforms by using MATLAB.
WEEK -7   **LAPLACE TRANSFORMS**
Finding the Laplace transform of a given signal and locate its zeros and poles in s-plane.
WEEK -8   **Z-TRANSFORMS**
Finding the z - transform of a given sequence and locate its zeros and poles in z-plane
WEEK-9   **CONVOLUTION BETWEEN SIGNALS AND SEQUENCES**
Finding convolution between two signals /sequences by using MATLAB.

WEEK-l0	**AUTO CORRELATION AND CROSS CORRELATION**

Finding auto correlation and cross correlation between signals and sequences by using MATLAB

WEEK-l1	**GAUSS IAN NOISE**

Generation of Gaussian noise, computation of its mean, M.S. value and its Skew, kurtosis, and PSD, probability distribution function by using MATLAB.

WEEK-l2	**WIENER – KHINCHINE RELATIONS**

Verification of wiener – Khinchine relations using MATLAB.

WEEK-l3	**DISTRIBUTION AND DENSITY FUNCTIONS OF STANDARD RANDOM VARIABLES**

Finding distribution and density functions of standard random variables and plot them by using MATLAB

WEEK-l4	**WIDE SENSE STATIONARY RANDOM PROCESS**

Checking a random process for stationary in wide sense by using MATLAB

Reference Books:

1. S. Varadarajan , M. M. Prasada Reddy , M. Jithendra Reddy , "Signals and systems introduces MATLAB programs", I K International Publishing House Pvt. Ltd, 2016.
2. Scott L. Miller, Donald G. Childers, "Probability and Random Processes: With Applications to Signal Processing and communications", Elsevier, 2004.
3. Krister Ahlersten, "An Introduction to Matlab", BookBoon, 2012.
4. K. S. Suresh Kumar, "Electric Circuit Analysis", Pearson Education, 1st Edition, 2013.

Web References:

1. http://in.mathworks.com/help/matlab
2. http://web.mit.edu/acmath/matlab/course16/16.62x/16.62x_Matlab.pdf
3. https://www.probabilitycourse.com/chapter12/Chapter_12.pdf
4. http://www.iare.ac.in

SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:

HARDWARE: Desktop Computer Systems 18 nos

SOFTWARE: MATLAB

HOD, ECE