

SIGNALS AND SYSTEMS LABORATORY

IV Semester: ECE

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

I. COURSE OVERVIEW:

This course integrates about the generation of both continuous and discrete time signals, basic operations, and frequency transformations of signals and systems. It covers the linear time invariant systems and their analysis in time and frequency domain. It can apply the concepts to obtain the correlation and convolution between signals and sequences, to find distribution and density functions of random variables. It provides the necessary background needed for understanding the signal processing and communications. This lab provides hands-on experience on implementation of communication systems using MATLAB software.

II. OBJECTIVES:

The course should enable the students to:

- I The basic syntax of signals, generations and operations of signals and sequences using MATLAB.
- II The spectral characteristics of signals using Fourier, Laplace and z transform.
- III The Implementation of convolution and correlation of signals and systems.

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

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|------|---|-------|
| CO 1 | Realize the tool basic operations addition, subtraction, multiplication and division on matrices | Apply |
| CO 2 | Generate standard signals and sequences for performing operations on various signals | Apply |
| CO 3 | Determine Fourier transform, properties of Fourier transform and Inverse Fourier transform of signal and sequence | Apply |
| CO 4 | Locate the poles and zeros of transfer function using Laplace and Z transforms. | Apply |
| CO 5 | Determine convolution and correlation between signals and sequences for analyzing linear time-invariant systems. | Apply |
| CO 6 | Compute mean, mean square and power spectral density of signal to calculate Gaussian noise. | Apply |

IV. SYLLABUS:

LIST OF EXPERIMENTS

WEEK-1	BASIC OPERATIONS ON MATRICES
Review basic operations on matrices by using MATLAB	
WEEK -2	GENERATION 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 10	AUTO CORRELATION AND CROSS CORRELATION
Finding auto correlation and cross correlation between signals and sequences by using MATLAB.	
WEEK 11	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 12	WIENER – KHINCHINE RELATIONS
Verification of wiener – Khinchine relations using MATLAB.	
WEEK 13	DISTRIBUTION AND DENSITY FUNCTIONS OF STANDARD RANDOM VARIABLES
Finding distribution and density functions of standard random variables and plot them by using MATLAB	
WEEK 14	WIDE SENSE STATIONARY RANDOM PROCESS
Checking a random process for stationary in wide sense by using MATLAB.	
Reference Books:	
<ol style="list-style-type: none"> 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:	
<ol style="list-style-type: none"> 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