3EC13: DIGITAL SIGNAL PROCESSING LABORATORY
CREDITS – 1 (LTP : 0,0,2)

Course Objective:
To provide a thorough understanding and working knowledge of various transform techniques to analyze discrete time signals and systems in time and frequency domain, design of digital filters, advanced DSP techniques and DSP processor with its applications.

Teaching and Assessment Scheme:

Teaching Scheme (Hours per Week)			Credits	Assessment Scheme				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE	CE	ESE	CE	
0	0	2	1	00	00	40	60	100

List of Experiments:

Sr. No.	Name of Experiment
1.	Introduction to MATLAB and generation of discrete time sinusoid signal with noise component. Smoothing the signal by applying Moving Average Filter in MATLAB. Also find magnitude and phase plot of Moving Average System.
2.	Write a MATLAB program (a) To perform Convolution of two discrete time sequences. (b) To compute Cross-correlation and Auto-correlation of two discrete time sequences
3.	Write a MATLAB program (a) To find the Fourier series of periodic square wave for odd symmetry and even symmetry using DTFT. (b) To find the Fourier series of periodic triangular wave for odd symmetry and even symmetry using DTFT. (c) To study of aliasing in sampling process using DTFT.
4.	Write a MATLAB program to design simple low pass filter using IDTFT.
5.	Write a MATLAB program (a) To find z-transform and inverse z-transform of various function. (b) To find impulse response and step response of given difference equation using z-transform. (c) To plot pole-zero of given system transfer function and check the stability.
6.	Design a Simulink Model in MATLAB for Direct form – I & II form realization of the given IIR system function.
7.	Write a MATLAB program (a) To find DFT and IDFT of a sequence without using the in-built function. (b) To Find the circular convolution of given sequences. (c) To find linear convolution of given sequences using DFT.
8.	Write a MATLAB program to compute DIT-FFT and DIF-FFT of given discrete time sequence without using the in-built function.
9.	Write a MATLAB program for Analog to Digital transformation using impulse invariance method and bilinear transformation method.
10.	Write a MATLAB program to design digital Butterworth (a) Low pass filter (b) High pass filter (c) Band pass filter (d) Band stop filter

Sr. No.	Name of Experiment
11.	Write a MATLAB program to design digital Chebyshev(Type-1) (a) Low pass filter (b) High pass filter
12.	Write a MATLAB program to plot magnitude response and phase response FIR Lowpass filter using Rectangular window and Hamming window.
13.	Write a MATLAB program for down-sampling and up-sampling the sum of sinusoids using decimation and interpolation by integer factor of 20.
14.	Introduction to DSP processor TMS 320C6713 DSK and Code Composer Studio. Also generate the sine and square wave in DSK6713 using Code Composer Studio.

List of References:

1. Oppenheim, Schafer & Buck, *"Discrete Time Signal Processing"*, 2nd Edition Pearson Education Publication, 2003
2. Proakis & Manolakis, *"Digital Signal Processing: Principles, Algorithm & Application",* 4th edition, Pearson Education, 2006
3. S. K. Mitra, *"Digital Signal Processing – A Computer Based Approach",* 3rd Edition, Tata McGraw Hill, 2006
4. S. Salivahanan, *"Digital Signal Processing"*, 3rd Edition, McGraw Hill Education, 2014

Course Outcomes (COs):

By learning this course student will be able to:

1. Understanding of frequency domain analysis of discrete time signals.
2. Use of various transforms to acquire knowledge about discrete time systems.
3. Design and analysis various digital filters for processing of discrete time signals.
4. Employ multiple sampling rates in the processing of digital signals.
5. Interpret the necessity of adaptive filters in communication applications.
6. Understand the key architectural features of Digital Signal Processor.