DIGITAL SIGNAL PROCESSING LABORATORY

VI Semester: ECE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AEC107	Core	-	-	3	2	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Implementation of convolution inMATLAB.
II. Implementation of digital signal processing algorithms in MATLAB andC.
III. Understand the real-time operation of digitalfilters.
IV. Analyze the Multirate signal processingalgorithms.
V. Identify suitable programs andImplementation of filters using DSP Kits.

COURSE OUTCOMES:

CO 1: Analyze and implement digital signal processing systems in time domain.
CO 2: Developand implement digital systems using the DFT and the Fast Fourier Transform (FFT).
CO 3: Compute circular convolution, linear convolution and the discrete Fourier transform (DFT) of discretetime signals.
CO 4: Construct the digital filters using windows.
CO 5: Design frequency-selective digital filters and Sample and reconstruct analog signals.

COURSE LEARNING OUTCOMES:

1. To generate elementary signals/ waveforms and perform arithmetic operations on signals.
2. Calculate and Plot DFT / IDFT of given DT signal and to generate Sinusoidal signal through filtering.
3. Able to plot frequency response of a given system and verify the properties of LTI system.
4. Implement FFT of given sequence and identify the reduction of computations using FFT.
5. Implementation of Linear convolution using DFT.
6. Implementation of Decimation-in-time radix-2 FFT algorithm.
7. Generation of linear convolution without using built in function and the function conv.
8. Generation of circular convolution without using built in function
9. Compute the Discrete Fourier Transform and IDFT with and without FFT and IFFT
10. To Implement LP FIR filter for a given sequence and calculate the filter coefficients.
11. Able to Implement IIR filter for a given sequence and plot the response of the same.
12. Implementation of FIR digital filter using window (Rectangular, Hamming, Hanning, Bartlett) methods.
13. Understand the operation to generate DTMF signals
14. Able to Implement I/D sampling rate converters and identify the importance of multi rate sampling
15. Construct IIR and FIR Filter Implementation using DSP Kits

LIST OF EXPERIMENTS	
WEEK - l	**CONVOLUTION**
a) Generation of linear convolution without using built in function and the function conv in MATLAB b) Generation of circular convolution without using built in function inMATLAB	
WEEK-2	**DISCRETE FOURIER TRANSFORM**
Compute the Discrete Fourier Transform and IDFT with and without fft and ifft in MATLAB	
WEEK-3	**APPLICATION OF DFT**
Implementation of Linear convolution using DFT (Overlap-add and Overlap-Save methods)	
WEEK -4	**DIT - FAST FOURIER TRANSFROM**
Implementation of Decimation-in-time radix-2 FFT algorithm	
WEEK -5	**DIF - FAST FOURIER TRANSFROM**
Implementation of Decimation-in-frequency radix-2 FFT algorithm	
WEEK -6	**IIR - BUTTERWORTH FILTER**
Implementation of IIR digital filter using Butterworth method and bilinear transformation	
WEEK -7	**IIR - CHEBYSHEV FILTER**
Implementation of IIR digital filter using Chebyshev (Type I and II) method	
WEEK -8	**FIR FILTER - WINDOW TECHNIQUES**
Implementation of FIR digital filter using window (Rectangular, Hamming, Hanning, Bartlett) methods	
WEEK-9	**FIR FILTER – SAMPLING TECHNIQUE**
Implementation of FIR digital filter using frequency sampling method	
WEEK-l0	**FIR FILTER – OPTIMUM EQUIRIPPLE**
Implementation of optimum equiripple FIR digital filter using window methods	
WEEK-l1	**DUAL TONE MULTI FREQUENCY**
DTMF Tone Generation and Detection Using Goertzel Algorithm	
WEEK-l2	**SAMPLING RATE CONVERTERS**
Implementation of sampling rate conversion by decimation, interpolation and a rational factor using MATLAB	
WEEK-l3	**DFT AND SINEWAVE USING TMS320C6713 KIT**
a) Implementation ofDFT b) Sine wave generation using lookup table with values generated fromMATLAB	
WEEK-l4	**FILTERS USING TMS320C6713 KIT**
IIR and FIR Filter Implementation using DSP Kits	
TEXT BOOKS:	
1. John G.Proakis, DimitrisG. Manolakis, –Digital signal processing, Principles, Algorithms and Applications‖, Prentice Hall, 4th Edition,2007.	

REFERENCE BOOKS:

1. P Ramesh babu, Digitalsignal processing, Principles, Algorithms , SCITECH, 6th Edition,2014.
2. B.PreethamKumar,–DigitalSignalProcessingLaboratory‖,CRCPress,2nd Edition,2010.
3. B.Venkata Ramani, M.Bhaskar, ― Digital Signal Processors- Architecture, Programming and applications‖, TMH, 2nd Edition,2002.

WEB REFERENCES:

1. http://eceweb1.rutgers.edu/~orfanidi/ece348/
2. http://www.eecs.umich.edu/courses/eecs452/refs.html
3. http://www.dsp.sun.ac.za/lab-reference-guide/
   http://www.iare.ac.in