



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad – 500043

Electronics and Communication Engineering

List of Laboratory Experiments

DIGITAL SIGNAL PROCESSING LABORATORY									
Course Code	Category	Hours / Week			Credits	Maximum Marks			
AECB25	Core	L	T	P	C	CIA	SEE	Total	
		0	0	2	1	30	70	100	
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36			Total Classes: 36				
Branch: ECE	Semester: VI	Academic Year: 2021-22			Regulation: R18				
<p>Course overview: This course is concerned with the implementation of digital signal processing algorithms using different computational platforms such as MATLAB and DSP tools that give core knowledge to develop the real time applications in the area of DSP. It focuses on the convolution, discrete Fourier transform, fast Fourier transform algorithms, digital filter design and multi rate signal processing. Digital signal processing applications are used in speech processing, image processing, audio and video data compression, communication systems.</p>									
<p>Course objectives: The students will try to learn:</p> <ol style="list-style-type: none"> I. The behavior of discrete time signals and systems in time and frequency domain. II. The analysis of IIR, FIR digital filters and multi rate signal processing systems. III. The implementation of real time digital signal processing algorithms using MATLAB tool and TI TMSC67XX target board. 									
<p>Course outcomes: After successful completion of the course, students should be able to:</p> <p>CO1: Apply discrete Fourier transform for spectral analysis of discrete signals.</p> <p>CO2: Make use of fast Fourier transform algorithms for reducing computational complexity of discrete Fourier transform.</p> <p>CO3: Compare IIR digital filter and FIR Digital filters using different methods.</p> <p>CO4: Analyze the Goertzel algorithm for the generation and detection of dual-tone multi-frequency (DTMF) signaling.</p> <p>CO5: Identify multi-rate signal processing methods such as decimation and interpolation for interfacing the digital systems with different sampling rates.</p> <p>CO6: Choose the digital signal processing algorithms for designing real time embedded signal processing applications.</p>									
WEEK NO	EXPERIMENT NAME							CO	
WEEK – I	LINEAR CONVOLUTION VS CIRCULAR CONVOLUTION							CO1	
	Generation of linear convolution without using built in function and the function conv in MATLAB Generation of circular convolution without using built in function in MATLAB.								
WEEK – II	DFT AND IDFT							CO1	
	Compute the Discrete Fourier Transform and IDFT with and without FFT and IFFT in MATLAB.								
WEEK – III	OVERLAP-ADD AND OVERLAP-SAVE METHODS							CO2	
	Implementation of Linear convolution using DFT (Overlap-Add and Overlap-Save methods).								
WEEK – IV	DIT-FFT ALGORITHM							CO2	
	Implementation of Decimation-in-time radix-2 FFT algorithm.								

WEEK – V	DIF-FFT ALGORITHM	CO2
	Implementation of Decimation-in-frequency radix-2 FFT algorithm.	
WEEK – VI	IIR DIGITAL FILTER USING BUTTERWORTH METHOD AND BILINEAR TRANSFORMATION	CO3
	Implementation of IIR digital filter using Butterworth method and bilinear transformation.	
WEEK – VII	IIR DIGITAL FILTER USING CHEBYSHEV (TYPE I AND II) METHOD	CO3
	Implementation of IIR digital filter using Chebyshev (Type I and II) method.	
WEEK –VIII	FIR DIGITAL FILTER USING WINDOWS	CO3
	Implementation of FIR digital filter using window (Rectangular, Hamming, Hanning, Bartlett) methods.	
WEEK - IX	FIR DIGITAL FILTER USING FREQUENCY SAMPLING METHOD	CO3
	Implementation of FIR digital filter using frequency sampling method.	
WEEK - X	OPTIMUM EQUI RIPPLE FIR DIGITAL FILTER	CO4
	Implementation of optimum equiripple FIR digital filter using window methods.	
WEEK - XI	DTMF TONE GENERATION AND DETECTION	CO4
	DTMF Tone Generation and Detection Using Goertzel Algorithm.	
WEEK - XII	SAMPLING RATE CONVERSION	CO5
	Implementation of sampling rate conversion by decimation, interpolation and a rational factor using MATLAB.	
WEEK - XIII	SINE WAVE GENERATION	CO2
	a. Implementation of DFT b. Sine wave generation using lookup table with values generated from MATLAB.	
WEEK - XIV	IIR AND FIR FILTERS USING DSP KITS	CO6
	IIR and FIR Filter Implementation using DSP Kits.	