COURSE TITLE : DIGITAL SIGNAL PROCESSING
COURSE CODE : 6044
COURSE CATEGORY : E
PERIODS/WEEK : 4
PERIODS/SEMESTER : 60
CREDITS : 4

TIME SCHEDULE

MODULE	TOPICS	PERIODS
1	Signals and Systems	15
2	Fourier and Z Transform	15
3	Fast Fourier Transform	15
4	Digital Signal Processor	15
TOTAL		**60**

Course General Outcome:

MODULE	G.O.	ON COMPLETION OF THE STUDY OF THIS COURSE THE STUDENTS WILL BE ABLE:
1	1	To understand different types of signals and signal operations
	2	To know different classification of systems
2	3	To understand Fourier and Z Transform
3	4	To understand Fast Fourier Transform
4	5	To understand Digital signal Processor

G.O - General Outcome

On the completion of the study the student will be able:

MODULE I SIGNALS AND SYSTEMS

1.1.0 To understand different types of signals and signal operators

1.1.1 To describe Discrete time signals
1.1.2 To define unit impulse, unit step , ramp and exponential signals
1.1.3 To describe Sinusoidal signals, periodic and aperiodic signals
1.1.4 To describe Even and odd signal, causal and non causal signal
1.1.5 To explain Shifting, time reversal and time scaling operator
1.1.6 To explain Scalar multiplication and signal multiplication
1.1.7 To explain Addition operator

1.2.0 To know different classification of systems

1.2.1 To explain discrete time system, linear and non linear, causal and non causal system
1.2.2 To describe Time variant and time invariant system
1.2.3 To define LTI system
1.2.4 To explain the block diagram of a DSP system
1.2.5 To list the advantage of DSP system

MODULE II FOURIER AND Z TRANSFORM

2.1.0 To understand Fourier and Z Transform

- 2.1.1 To Describe discrete Fourier series
- 2.1.2 To describe discrete Fourier transform
- 2.1.3 To find DFT of unit impulse and other dc signal, sinusoidal signal
- 2.1.4 To list properties of DFT
- 2.1.5 To state Linearity and periodicity, circular shift and symmetry
- 2.1.6 To explain circular convolution
- 2.1.7 To define Z Transform
- 2.1.8 To discuss Z transform of unit step, unit impulse and sinusoidal signal
- 2.1.9 To discuss properties of Z transform; linearity, left shift ,right shift
- 2.1.10 To explain convolution, Multiplication by $a^n u(n$, initial value theorem and final value theorem
- 2.1.11 To discuss inverse Z transform
- 2.1.12 To list the types inverse Z transform
- 2.1.13 To find inverse Z transform by partial fraction method – simple problems

MODULE III FAST FOURIER TRANSFORM

3.1.0 To understand Fast Fourier Transform

- 3.1.1 To explain Decimation in time
- 3.1.2 To discuss 4 point and 8 point FFT using radix 2 DIT block diagram
- 3.1.3 To draw 8 point FFT using radix 2 DIT butterfly diagram
- 3.1.4 To explain decimation in frequency
- 3.1.5 To discuss 4 point and 8 point FFT using radix 2 DIF block diagram
- 3.1.6 To draw 8 point FFT using radix 2 DIF butterfly diagram

MODULE IV DIGITAL SIGNAL PROCESSOR

4.1.0 To understand Digital signal Processor

- 4.1.1 To describe FIR filters
- 4.1.2 To explain about FIR filter coefficients
- 4.1.3 To describe about FIR windows
- 4.1.4 To describe IIR filters
- 4.1.5 To explain about IIR filter coefficients
- 4.1.6 To discuss the overview of Digital signal processors
- 4.1.7 To describe the selection of digital signal processor
- 4.1.8 To explain architectural features, execution speed, type of arithmetic, word length
- 4.1.9 To explain the Texas DS processor TMX320c50 DSP
- 4.1.10 To describe the addressing Modes of TMX320c50 DSP
- 4.1.11 To list the DSP applications

CONTENTS

MODULE I SIGNALS AND SYSTEMS

Classification of signals- discrete time signals- unit step –unit ramp-unit impulse, exponential sequence,sinusoidal signal - periodic and non periodic signals,even and odd signals - causal and non-causal signal, operation of signal –shifting, time reversal , time scaling, scalar multiplication, signal multiplier, addition, discrete time system – classification – linear and nonlinear system – causal and non-causal system – time variant and time invariant system, LTI system - block diagram of a DSP system – advantages of a DSP system

MODULE II FOURIER AND Z TRANSFORM

Fourier series- fundamentals - Discrete Fourier transform- DFT of unit impulse, unit step signal, sinusoidal signal, properties of DFT- linearity- periodicity- circular shift – symmetry property- circular convolution of time domain signal- circular convolution of frequency domain ,Z- transform- Z-transform of unit step- unit impulse – sinusoidal, property of z- transform- linearity – left shift of a signal- right shift of a signal- convolution – multiplication by $a^n u(n)$ – initial value theorem – final value theorem , inverse z- transform

MODULE III FAST FOURIER TRANSFORM

Decimation in Time(DIT) – 4 point and 8 point FFT using radix 2 DIT FFT- flow graph for 8 point DFT, Decimation in Frequency(DIF)- 4 point and 8 point FFT using radix 2 DIF FFT, comparison of DIT and DIF.

MODULE IV DIGITAL SIGNAL PROCESSOR

Filters – types - FIR filter – coefficients - FIR windows, IIR filters – coefficients, Overview of a digital signal processor – selecting a digital signal processor- architecture of Texas Instruments- TMX320c50 DSP – CPU – Central ALU – Parallel Logic Unit – Auxiliary Register -Arithmetic unit- index Register- Aux. Reg Compare Reg. - Block move address register – status register- program controller- program counter – on chip memory – on chip peripherals, addressing modes, Applications of DSP

TEXT BOOK

1. Digital Signal Processing – Salivahanan – TMH - 2nd Edition
2. Digital Signal Processing - P Ramesh Babu , Scitech - 4 th Edition

REFERENCE

1. Digital Signal Processing – Nagoor Kani – TMH
2. Digital Signal Processing – Alan V Oppenheim, Ronald W Schafer (Pearson)
3. A Text book of Digital Signal Processing – R S Kaler, M Kulkarni, Umesh Gupta(I K International publishing company, NewDelhi)