SCHEME OF COURSE WORK

Course Details:

Course Title	: **DIGITAL SIGNAL PROCESSING**		
Course Code	**:** 13EC1122	**L T P C**	**: 4 1 0 3**
Program:	**: B.Tech.**		
Specialization:	**: Electronics & Communication Engineering**		
Semester	**: VI**		
Prerequisites	**: SIGNALS AND SYSTEMS**		
Courses to which it is a prerequisite	**: -- Digital Signal Processors and Architectures, ADSP**		

Course Outcomes (COs):

CO1	Comprehend the representation of discrete time signals and systems
CO2	Describe the basic principles of digital signal processing
CO3	Comprehend the Fourier transform for Signal Processing
CO4	Design and Analyze the Frequency response of FIR and IIR filters.
CO5	Comprehend the concept of Multirate DSP and applications of DSP

Course Outcome vs. **Program Outcomes:**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	S	S	S	M	M	M	M		S		M	M
CO-2	S	S	S	S	S	M	M		S			M
CO-3	M	M	S	M	M				S			M
CO-4	M		M	M	S				S			S
CO-5	M		S	M	M		M		S		M	S

S - Strongly correlated, *M - Moderately* correlated, *Blank - No correlation*

Assessment Methods:	Assignment / Quiz / Seminar / Case Study / Mid-Test / End Exam

Teaching-Learning and Evaluation

Week	TOPIC / CONTENTS	Course Outcomes	Sample questions	TEACHING-LEARNING STRATEGY	Assessment Method & Schedule
1	**UNIT-I** Introduction to Digital Signal Processing, Review of discrete-times Signals and systems, analysis of discrete-time linear time invariant Systems.	CO-1	1. Describe the applications of Digital Signal Processing. 2. Analyze and test the various discrete time systems.	▫ Lecture ▫ Discussion	Assignment I/Quiz-I/Mid-I
2	Frequency domain representation of discrete time signals and systems, Introduction, Impulse Response and Convolution Sum, Convolution of Infinite sequences.	CO-1	1. Discuss the role of frequency domain signal processing. 2. Describe about Impulse Response.	▫ Lecture ▫ Discussion	Assignment I/Quiz-I/Mid-I
3	Circular shift and Circular Symmetry, Periodic and Circular Convolution, Methods of obtaining Circular Convolution.	CO-1	1. Distinguish between linear and circular convolution. 2. Analyze the periodic and circular convolution methods.	▫ Lecture ▫ Discussion	Assignment I/Quiz-I/Mid-I
4	**UNIT-II** Introduction, Discrete Fourier Series, Properties of DFS, Introduction to Discrete time Fourier transform.	CO-2	1. Distinguish between DFS and DFT. 2. Analyze the properties of	▫ Lecture ▫ Discussion	Assignment I/Quiz-

			DFT.		I/Mid-I
5	Inverse DTFT, Properties of DTFT, Relation between Z-Transform and DTFT.	CO-2	1. Discuss about DTFT. 2. Analyze the properties of DTFT.	▫ Lecture ▫ Discussion	Assignment I/Quiz-I/Mid-I
6	Frequency Response of Discrete Time Systems, Transfer Functions.	CO-2	1. Analyze the role of frequency response. 2. Discuss about transfer functions	▫ Lecture ▫ Discussion	Assignment I/Quiz-I/Mid-I
7	**UNIT-III** Introduction, Discrete Fourier Transform, Inverse DFT, Properties of DFT.	CO-3	1. Describe DFT representation. 2. Analyze the properties of DFT.	▫ Lecture ▫ Discussion	Assignment I/Quiz-I/Mid-I
8	Linear Convolution and Circular Convolution using DFT, Introduction, Fast Fourier Transform.	CO-3	1. Distinguish between Linear and Circular convolution 2. Explain the role of FFT	▫ Lecture ▫ Discussion	Assignment I/Quiz-I/Mid-I
9	**Mid-Test 1**	CO-1, CO-2, CO-3			
10	Radix-2 Decimation in time FFT, Radix-2 Decimation in frequency FFT, Inverse FFT.	CO-3	1. Compute the FFT of x(n) = {1,1,1,1,1,1,1,1} using DITFFT. 2. Analyze the computation of IFFT.	▫ Lecture ▫ Discussion	Assignment II/Quiz-II/Mid-II
11	**UNIT-IV** Introduction, Analog filter approximations – Butterworth and Chebyshev.	CO-4	1. Distinguish between Chebyshev and Butterworth approximations. 2. Analyze the role of IIR filters	▫ Lecture ▫ Discussion	Assignment II/Quiz-II/Mid-II
12	Design of IIR Digital filters from analog filters by Impulse invariant and bilinear transformation methods, Frequency transformations, and Basic structures of IIR Filters.	CO-4	1. Analyze Impulse Invariant and Bilinear transformation methods. 2. Describe the basic structures of IIR filter	▫ Lecture ▫ Discussion	Assignment II/Quiz
13	Introduction, Characteristics of FIR filters with Linear phase, Frequency response of linear phase FIR filters.	CO-4	1. Compare IIR and FIR digital filters 2. Analyze the properties of FIR filters	▫ Lecture ▫ Discussion	Assignment II/Quiz
14	Design of FIR filters using windows (Rectangular, Triangular, Raised Cosine, Hanning, Hamming, Blackman and Kaiser), Comparison of IIR & FIR filters, Basic structures of FIR Filters.	CO-4	1. Discuss the design of FIR filters using Window techniques 2. Describe the basic structures of FIR filter	▫ Lecture ▫ Discussion	Assignment II/Quiz
15	**UNIT-V** Decimation, interpolation, sampling rate conversion, Implementation of sampling rate conversion.	CO-5	1. Analyze Decimation and Interpolation methods. 2. Discuss and implement the sampling rate conversion	▫ Lecture ▫ Discussion	Assignment II/Quiz
16	Voice Synthesizers, Vocoders, Image Processing	CO-5	1. Describe about Voice synthesizers and Vocoders.	▫ Lecture ▫ Discussion	Assignment II/Quiz
17	Image Processing (Qualitative Treatment Only), Radar Signal Processing.	CO-5	1. Analyze the role of Image processing and Radar Signal Processing.	▫ Lecture ▫ Discussion	Assignment II/Quiz-II/Mid-II
18	**Mid-Test 2**	CO-3 , CO-4, CO-5			
19/20	**END EXAM**				