DIGITAL SIGNAL PROCESSING

Course Code	20EE4601C	Year	III	Semester(s)	II
Course Category	Professional Elective-II	Branch	EEE	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Signals & Systems
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes
Upon successful completion of the course, the student will be able to
CO1	**Understand** the fundamentals of discrete-time systems and decimation, interpolation in multi rate digital signal processing (L2).
CO2	**Apply** Fourier Transforms to develop DFT,FFT and construct direct, cascade form structures of digital systems (L3).
CO3	**Apply** various mapping techniques, window methods to find transfer function of digital filters and sampling rate conversion in DSP applications (L3).
CO4	**Analyze** causality, stability of LTI systems and circular convolution using DFT (L4).
CO5	**Analyze** the IIR and FIR digital filters for the given specifications (L4).
CO6	Submit a report on various concepts of Digital signal processing .

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:High, 2: Medium, 1:Low)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1														
CO2	3												2	1
CO3	3						2						2	1
CO4		3											2	1
CO5		3	3			2		2					2	1
CO6									3	3	3	3	2	1

SYLLABUS		
Unit No.	Contents	Mapped CO
I	**Transform Analysis of Discrete time LTI Systems** Analysis of Discrete-time Linear Time-Invariant Systems, review of convolution-matrix method, system function of LTI systems characterized by linear constant coefficient difference equations: Stability, Causality, Impulse response and Step response for rational system functions**.**	CO1,C04, CO6
II	**The Discrete Fourier Transform (DFT)** Introduction to DFT, Properties of the DFT, Circular Convolution, Relationship among DTFT,DFT and ZT, Inverse FFT, computation of DFT and IDFT	CO1,CO2 CO4, CO6

	FFT Algorithms Radix-2 Decimation-In-Time(DIT)and Decimation-In-Frequency(DIF)FFT Algorithms	
III	**Design of IIR Digital Filter** Design procedure for Analog Butterworth and Chebyshev filters, Design of IIR Digital Filters using Impulse Invariant method and Bilinear Transformation, examples. Realization of IIR systems - Direct,Cascade forms	CO1,CO2, CO3,CO5, CO6
IV	**Design of FIR Digital Filters** Introduction to FIR Filters,Design of Linear phase FIR digital filters using Window method,Frequency Sampling Method. Realization of FIR systems-Direct,Cascade forms	CO1,CO2,CO3 ,CO5, CO6
V	**Multi rate Digital Signal Processing** Introduction, Down Sampling, Decimation, Up sampling, Interpolation, Sampling Rate Conversion, Applications of Multi rateSignal processing.	CO1,CO3, CO6

Learning Resources
Text Books
1.John G Proakis &D.G.Manolakis, Digital Signal Processing: Principles, Algorithms and Applications, PEARSON , 4th Edition, 2007. 2. AlanV.Oppenheim, Ronald W.Schafer, Descrete time signal processing ,PEARSON,3rd Edition,2014
Reference Books
1. Lonnie C Ludeman ,Fundamentals of Digital Signal Processing, John Wiley & Sons, 2013 2. Lawrence R Rabiner& BernardGold ,Theory and Application of Digital Signal Processing, Prentice Hall of India, 3rd series 1975
Web Links 1. https://nptel.ac.in/courses/108106151