

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
DIR1E4: Advance Digital Signal Processing	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objective:

To provide clear conceptual knowledge of different DSP algorithms and to introduce speech, multimedia and other signal processing applications.

Prerequisite(s): A basic course in Digital signal processing.

COURSE CONTENTS

Unit I

Overview of DSP, FIR filters, IIR filters, design techniques of linear phase FIR filters, IIR filters by impulse invariance, bilinear transformation, Linear prediction & optimum linear filters stationary random process, forward-backward filters linear prediction, solution of normal equation.

Unit II

Multi rate DSP, Sampling rate conversion, poly phase filters, multistage decimator & interpolator, QMF, digital filter banks, DFT in spectral estimation, Adaptive filters & spectral estimation.

Unit III

Minimum mean square criterion, LMS algorithm, Recursive least square algorithm, Application of DSP & Multi rate DSP Application to Radar, introduction to wavelets, application to image processing, design of phase shifters, DSP in speech processing & other applications.

Unit IV

Image representation: Gray scale and color images, image sampling and quantization. Image enhancement: Filter in spatial and frequency domains, histogram based processing and homomorphic filtering. Edge Detection edge linking, boundary descriptors. Image Segmentation: Thresholding, region based segmentation Image Compression: lossy and lossless compression techniques.

Unit V

Entropy coding, lossy and lossless predictive coding, uniform and non uniform quantizers, transform based compression, JPEG, Image reconstruction from projections: Principles, mathematical basis of tomography. Projections, The Fourier Slice Theorem, Reconstruction Algorithms for Parallel Projections, Three dimensional projections. Computer visualization of 3D data: Rendering techniques: Surface based and volume based techniques. Direct Volume rendering: Ray casting, opacity function. Maximum Intensity Projection

Text and Reference Books:

[1] Gonzalez and Woods :Digital Image Processing, Pearson Education 3rd Edition

[2] A.K.Jain : Fundamentals of Digital image processing, PHI

[3] J.G. Proakis and D.G. Manolakis Digital signal processing: Principles, algorithm and applications, Macmillan publishing

[4] Ifeachor E.C., Jervis B.W. Digital signal processing, a Practical approach, 2nd ed. Pearson edu. 2003.

[5] Salivahanan, Vallavaraj & Gnanpriya Digital signal processing:: Tata Mcgraw Hill

[6] S.W.Smith Digital signal processing: A practical guide for engineers and scientists, Elsevier

[7] S.K.Mitra, Digital signal processing: Tata Mcgraw Hill.