Devi Ahilya University, Indore, India Institute of Engineering & Technology				**III Year B.E. (Electronics and Telecommunication)**			
Subject Code & Name	**Instructions Hours per Week**			**Credits**			
ETR5G3	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
DIGITAL SIGNAL PROCESSING	**3**	**1**	**0**	**3**	**1**	**0**	**4**
Duration of Theory Paper: 3 Hours							

Learning Objectives:

To provide the analysis techniques like for discrete time systems analyze the discrete time systems in time and frequency domain using Z- Transform and Fourier transforms to learn the signal processing tool box of MATLAB for implementing the basic problems of DSP designing of digital filters.

Prerequisite(s): Awareness about the analysis of analog signals and systems and analog filter design.

COURSE OF CONTENTS

Unit-I

Introduction to signal processing , Discrete time signals and sequence operations , Discrete time systems properties ,Linear time invariant systems ,convolution ,properties of LTIV systems ,Inverse system .Frequency domain representation of discrete time signals and systems(DTFT), properties,Representation of sequences by Fourier transforms.

Unit-II

Introduction to Z- transforms , properties , Inverse Z – transform, ,block diagram representation of linear constant coefficient difference equation,Signal flow graph representation of LCCDE, Basic structures for IIR systems ,Basic structures for FIR systems. Representation of periodic sequences , the discrete Fourier series ,properties of DFS, Fourier transform of periodic signals, properties,circular convolution ,linear convolution using DFT, Implementing LTIV systems using DFT.

Unit-III

Efficient computation of DFT , Goertzel algorithm , decimation in time FFT algorithm, In place computation, alternative forms , decimation in frequency FFT algorithm , In place computation, alternative forms.

Unit IV

Filter design techniques ,Design of discrete time IIR filters from continuous time filters, filter design by impulse invariance , bilinear transformation ,design of FIR filters by windowing properties of commonly used windows.

Unit V

Introduction of DSP Processor.Types of Digital signal processors , Applications.

Learning Outcome:

At the end of the course, students should be able to do the following:

- Analyze discrete-time systems in both time & transform domain and also through pole-zero placement.
- Analyze discrete-time signals and systems using DFT and FFT.
- Design and implement digital finite impulse response (FIR) filters.
- Design and implement digital infinite impulse response (IIR) filters.
- Understand and develop multirate digital signal processing systems.

BOOKS RECOMMEDED

[1] Oppenheim and Schafer, Discrete time signal processin, 2/E PHI, 2005.
[2] Proakis and Manolakis, Discrete time signal processing, PHI, 2005.
[3] S. Mitra, Discrete time signal processing, Pearson Education.