

<b>Devi Ahilya University, Indore, India Institute of Engineering &amp; Technology</b>				<b>II Year B.E. (Computer Engg.) (Full Time)</b>			
<b>Subject Code &amp; Name</b>	<b>Instructions Hours per Week</b>			<b>Credits</b>			
<b>CER4G2 DIGITAL SIGNAL PROCESSING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Total</b>
	<b>3</b>	<b>1</b>	<b>-</b>	<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>
<b>Duration of Theory Paper: 3 Hours</b>							

**Objectives:** To provide the analysis techniques like for discrete time system analyse the discrete time systems in time and frequency domain using Z- transform, Fourier transform, Discrete Fourier transform to learn the signal processing.

**Prerequisites:** Awareness about the analysis of signals and systems

### COURSE CONTENTS

#### Unit-I

Introduction to signal processing, discrete time signals and sequence operation, properties. Discrete time systems, their properties, linear time invariant systems, convolution, properties of LTIV systems, inverse system, linear constant coefficient difference equation and their solutions.

#### Unit-II

Frequency Domain Representation of discrete time signals and systems, suddenly applied complex exponentials inputs, representation of sequences by Fourier transform, condition of their convergence, symmetry properties of FT, Fourier transform theorems.

#### Unit-III

Introduction to Z transforms, ROC and their properties, Inverse Z transform, Z transform properties, initial value theorem, structure for discrete time systems, and block diagram representation of linear constant coefficient difference equations. Signal flow graph representation of LCCDE, basic structure for IIR system, direct forms, cascade, parallel forms, transposed forms.

#### Unit-IV

Representation of periodic sequences, discrete Fourier series, properties of DFS, Fourier transform of periodic signals, sampling the FT, Fourier representation of finite duration sequences, the discrete Fourier transform, Circular convolution, linear convolution using DFT, implementing LTIV system using DFT.

#### Unit-V

Basic structure for FIR systems, direct form, cascade form structures. Efficient Computation of DFT, Goertzel algorithm, decimation in time FFT algorithm, In place Computation, alternative forms, decimation in frequency FFT algorithm, algorithm for N composite number, prime factor algorithm.

#### Books Recommended:

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