DIGITAL SIGNAL PROCESSING

Paper Code	**ECS-602**
Course Credits	4
Lectures/ Week	3
Tutorials/ Week	1

Course description

UNIT- I DISCRETE TIME SIGNALS AND SYSTEMS

Review of Discrete Time Fourier Transform, Z-transform, Properties of Z-transform, Discrete Time convolution, Difference equations, Direct Form I and II structures and stability analysis using Z-Transform.

UNIT- II DISCRETE FOURIER TRANSFORM

Introduction, The DFT: Fourier representation of periodic signals, properties of DFT: Linearity, Periodicity, Circular shift of a sequence, circular convolution and multiplication of two DFTs, Fast Fourier Transform (FFT) Algorithms: Decimation in Time and Decimation in Frequency domain.

UNIT- III INFINITE IMPULSE RESPONSE DIGITAL FILTER DESIGN

Introduction to III filters, Design of IIIR filters, Bilinear Transformation, Impulse Invariant Response method and Step-Invariant Response method. Digital filter transformation, Design examples.

UNIT-IV FINITE IMPULSE RESPONSE DIGITAL FILTER DESIGN

Introduction to FIRDF, Characteristics of FIR filters, Design of FIR filters: Fourier series and Window function method, Design examples

UNIT-V APPLICATIONS OF DSP

Introduction, Application to Image Processing: Image formation and recording, Image sampling and quantization, Image compression, Image restoration, Image enhancement. Application in RADAR. Application to Speech Processing: Model of Speech Production, Short time Fourier Transform and Synthesis of Speech, Speech Synthesis, Channel Vocoders, Subband coding of Speech and Audio signals: Transmitter, Receiver.

Pre-requisite Signals and Systems

Course/Paper:

Text Book: 1. J G Proakis and D G Manolakis, “Introduction to Digital Signal Processing”, PHI,1989.

.**Reference Books:**

1. Andreas Antonio, “*Digital Filter Analysis, Design and Application*”, McGraw Hill (International Edition), 1993

2. A V Oppenheim and R W Shafer, “*Digital Signal Processing*”, PHI, 1985

3. L R Rabiner and B Gold, “*Theory and Application of Signal Processing*”, PHI, 1985.

4. Roman Kuc, “*Introduction to Digital Signal Processing*”, McGraw Hill Book Co, 1988.

Course Outcomes

CO1: An ability to represent discrete time signals and their analysis using Z-transform

CO2: A thorough understanding of properties of DFT and algorithms of FFT

CO3: An understanding of the basic concept of IIR filters

CO4: An understanding of the basic concept of FIR filters and window functions

CO5: Afamiliarity with various applications of DSP

Computer usage/ Simulations using MATLAB

Software required: