

Semester-I, Paper-5
DIGITAL SIGNAL PROCESSING

Teaching Scheme:

Lectures: 4 hrs/week

Practical: 2-hrs/week

Examination scheme:

Theory: 100 marks

Term work: 25 marks

Practical: 25 marks

UNIT 1

(10 hrs 20 Marks)

Overview of continuous time signal & discrete time signal, properties of discrete signal, energy and power signal, Response of LTI system using linear convolution, Difference equation & response of system from difference equation.

Z transforms, ROC of Z transform & its properties, system transfer function, impulse response of LTI system using Z transform.

UNIT 2

(10 hrs 20 Marks)

Discrete time Fourier series & its properties, DFT & its properties, circular convolution, frequency response analysis of signal using DFT, linear filtering based on DFT FFT algorithm, use of FFT for spectral estimation, filtering & correlation.

UNIT 3

(10 hrs 20 Marks)

Introduction to Infinite Impulse Response Filter, Butterworth, Chebyshev approximation. Design of IIR filter: impulse invariance method, bilinear transformation, and digital-to-digital transformation, Introduction to computer-aided design of IIR filter. Realisation methods for IIR filter.

UNIT 4

(10 hrs 20 Marks)

Introduction to Finite Impulse Response Filter, FIR filter design using windows & frequency sampling method, design of optimal equiripple linear phase FIR filter, design of FIR differentiators and Hilbert transform, Introduction to computer-aided design of linear phase FIR filter, basic structure of FIR system.

UNIT 5

(10 hrs 20 Marks)

Introduction to DSP hardware, TMS320C67XX processor, applications of TMS 320C67XX e.g. square wave generator, matrix multiplication, and Applications of DSP processor for biomedical, speech, radar & image processing.

References:

1. Digital Signal Processing: Principles, algorithms and applications, "Proakis, Manolakis", PHI
2. Digital Signal Processing, "Oppenheim, Schaffer", PHI
3. Digital Signal Processing, applications using C & TMS320CSX DSK, "Rulph Chassaing", (WILAY publication).
4. Digital filter analysis & Design, "A Antoniou j", McGraw Hill 1979.
5. Digital Signal Processing Implementation using DSP microprocessors with examples from TMS320C54XX, "Avtar Singh, S. Srinivasan"
6. TMS 320C67XX DSP Reference Set, Vol. 2 1999

List of Experiments:

1. Shifting and folding of digital signal.
2. Linear convolution
3. Discrete Fourier transforms.
4. Fast Fourier transforms
5. Design and implement FIR filter using windowing method
6. Design and implement IIR filter using Butterwoth approximation
7. Design and implement IIR filter using Chebeshev approximation
8. Sine/square wave generation using TMS32OC67XX
9. FIR filter implementation using TMS32OC67XX
10. IIR filter implementation using TMS32OC67XX
11. FFT implementation using TMS32OC67XX

Term work shall include minimum **eight** experiments from above list.