III Year-II Semester					
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23EC6T11	DIGITAL SIGNAL PROCESSING	3	0	0	3

Course Outcomes:
- Understand the concepts of discrete signals and discrete systems with its characteristics [BL2]
- Calculate z-Transform, Fourier Transform, Discrete Fourier Transform of discrete signals.[BL6]
- Understand the algorithms for the efficient computation of DFT coefficients of signals[BL2]
- Design the FIR and IIR filters.[BL6]
- Know the architectures of various DSP processors and its addressing modes, assembly language instructions.[BL5]

UNIT-1:
Introduction: Signals, Systems, and Signal Processing, Classification of Signals, The Concept of Frequency in Continuous Time and Discrete Time Signals
Discrete Time Signals and Systems: Discrete Time Signals, Discrete Time Systems, Analysis of Discrete Time Linear Time Invariant Systems, Discrete Time Systems Described by Difference Equations, Implementation of Discrete Time Systems, Correlation of Discrete Time Signals.
Frequency Analysis of Signals: Frequency Analysis of Continuous Time Signals, Frequency Analysis of Discrete Time Signals, Frequency Domain and Time Domain Signal Properties, Properties of the Fourier Transform for Discrete Time Signals. **Frequency Domain Analysis of LTI Systems:** Frequency domain characteristics of LTI systems, Frequency response of LTI systems.

UNIT-2:
The z-Transform and Its Applications to the Analysis of LTI Systems: The z-Transform, Properties, Rational z Transforms, Inversion of the z-Transform, Analysis of Linear Time Invariant Systems in the z-Domain, The One sided z-Transform. (**Review only for entire z – Transform topic**).
The Discrete Fourier Transform: Its Properties and Applications: Frequency Domain
Sampling: The Discrete Fourier Transform, Properties of the DFT, Linear Filtering Methods Based on the DFT, Frequency Analysis of Signals Using DFT
UNIT-3:
Efficient Computation of the DFT: Fast Fourier Transform Algorithms: Direct Computation the DFT, Radix-2 FFT Algorithms.
Implementation of Discrete Time Systems: Structures for the Realization of Discrete Time Systems, **Structures for FIR Systems**: Direct Form Structure, Cascade Form Structures, Frequency Sampling Structures.
Structures for IIR Systems: Discrete Form Structures, Signal Flow Graphs and Transposed Structures, Cascade Form Structures, Parallel Form Structures.

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UNIT-4:

Design of Digital Filters: General Considerations: Causality and Its Implications, Characteristics of Practical Frequency Selective Filters.

Design of FIR Filters: Symmetric and Antisymmetric FIR Filters, Design of Linear Phase FIR Filters Using Windows, Design of Linear Phase FIR Filters by the Frequency Sampling Method. **Design of IIR Filters From Analog Filters**: IIR Filter Design by Approximation of Derivatives, IIR Filter Design by Impulse Invariance, IIR Filter Design by the Bilinear Transformation.

Frequency Transformations: Frequency Transformations in the Analog Domain, Frequency Transformations in the Digital Domain.

UNIT-5:

Introduction to programmable DSPs: Multiplier and Multiplier Accumulator, Modified bus structures and memory access schemes in P-DSPs ,Multiple Access Memory, Multiported memory, VLIW architecture, Pipelining, Special addressing modes, On-Chip Peripherals.

Architecture of TMS320C5X: Introduction, Bus Structure, Central Arithmetic Logic Unit, Auxiliary Register ALU, Index Register, Auxiliary Register Compare Register, Block Move Address Register, Block Repeat Registers, Parallel Logic Unit, Memory mapped registers, program controller, some flags in the status registers, On- chip memory, On-chip peripherals.TMS320C5X Assembly Language Instructions.

TEXT BOOKS:

1. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, DimitrisG.Manolakis, 4th Edition, Pearson Education, 2007.
2. Digital Signal Processors – Architecture, Programming and Applications,,B.Venkataramani, M.Bhaskar, TATA McGraw Hill, 2002.

Reference Books:

1. Discrete Time Signal Processing – A.V.Oppenheim and R.W. Schaffer, 3rd Edition, Pearson, 2014.
2. Digital Signal Processing-P. Ramesh Babu, 5th Edition, SCITECHPublishers.

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