DSP PROCESSORS

17ECMC2T5C   **Credits: 4**
Lecture: 4 periods/week   **Internal assessment: 40 marks**
     Semester end examination: 60 marks

Prerequisites: Signals & Systems,Digital Signal Processing

Course Objectives:

- To understand the key principles underpinning DSP through design examples.
- To understand the architecture of a digital signal processor and some programming issues in real-time implementation.
- To analyze various on-chip peripherals of DSP processors.
- To design real-time signal processing algorithms using a DSP processor.

Course Outcomes:
- Design DSP filters suitable for real-time applications.
- Understandthe architecture and pipeline operations of DSP Processors
- Illustrate the features of on-chip peripherals and interrupts ofTMS320C54XXDSP Processor.
- Implement various DSP algorithms using DSP processors.

UNIT I

Introduction: Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors.

UNIT II

Architectures for Programmable DSP Devices: Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Hardware looping, Interrupts, Stacks, Relative Branch Support, Pipelining and Performance, Pipeline Depth, Interlocking, Branching effects, Interrupt effects, Pipeline Programming models.

UNIT III
Programmable Digital Signal Processors: Commercial Digital Signal Processing Devices, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control,On-Chip Peripherals, Interrupts of TMS320C54XX Processors, Pipeline Operation of TMS320C54XX Processors.

UNIT IV

Implementationof Basic DSP Algorithms: The Q-notation, FIR Filters, IIR Filters, Interpolation Filters, Decimation Filters, PID Controller, Adaptive Filters, 2-D Signal Processing.FFT Algorithm for DFT Computation, A Butterfly Computation, Overflow and scaling, Bit- Reversed index generation, An 8-Point FFT implementation on the TMS320C54XX, Computation of the signal spectrum.

Text Books

1.Digital Signal Processing – Avtar Singh and S.Srinivasan, Thomson Publications, 2004.

References:

1. Digital Signal Processors, Architecture, Programming and Applications - B. VenkataRamani and M. Bhaskar,TMH, 2004.

2. Digital Signal Processing - Jonatham Stein, John Wiley, 2005

3. DSP Processor Fundamentals, Architectures & Features - Lapsley et al. S. Chand & Co, 2000.