GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. Embedded Systems (Branch Code - 54)

Year – II (Semester – III)

Subject: Digital Signal Processor Architecture and Applications (735402)

Sr. No.	Course Content	Hours
1	**Introduction to Digital Signal Processors** Programmable DSP Processors (P-DSPs), Multiplier and Multiplier Accumulator (MAC), modified bus structures and memory access schemes in P-DSPs, Multiple Access Memory, VLIW architecture, Pipelining, Special addressing modes in P-DSPs, Software Programming Tools for P-DSP, Optimizing Compiler and code generation for P-DSP, Programming of P-DSP, On-chip peripherals	12
2	**Implementation Considerations** Fixed-point & floating-point numbers and arithmetic, Quantization, Overflow and solutions, Rounding and truncation, Real-time Implementation Considerations: Signal converters, Stream processing, Block processing, Vector processing; Hardware Interfacing: External memory interfacing, Serial & parallel port interfacing, Host-port interfacing, Multiprocessing techniques	12
3	**Fixed-point Digital Signal Processors** Introduction, Bus structure, Central Arithmetic Logic Unit (CALU), Auxiliary Register ALU (ARALU), Index register, Block Move Address register, Block Repeat registers, Assembler directives; Architecture overview, CPU, Addressing modes, Instruction set: Addition/Subtraction instructions, Load/Store instructions, Move instructions, Multiplication instructions, NORM and Program control instructions; Programming considerations & issues of TMS320C54x and TMS320C55x processors	16
4	**Floating- Point Processors: TMS320C3x and TMS320C67x** Introduction, Bus Structure, Central ALU, Auxiliary Register ALU, Index Register, Auxiliary Register ALU, Block Move Address Register, Block repeat registers, parallel logic unit, memory-mapped registers, program controller, flags in status register, on-chip memory, on-chip peripherals, Assembly Language Syntax, Addressing Modes and instructions, pipelining in C3x and C67x	22
5	**Applications of Digital Signal Processors** FIR and IIR filtering applications, Adaptive filtering, FFT, Discrete Cosine Transform (DCT) and Other transforms; Real-time applications in	10

	Automation and Process control, Communication and telecom, Health tech, Consumer and Portable electronics	
	Total	**72**

Reference Books:

1. Digital Signal Processors: Architectures, Implementations and Applications by Sen M. Kuo and Woon-Seng S. Gan, Pearson Education
2. Digital Signal Processors: Architectures, Programming and Applications by B Venkatramani and M Bhaskar, TMH