

Year & Sem:	Course Code: EC3605	Course Name: VLSI Design for DSP	No. of Credits: 4	L 2	T&PS 2	P 0
UNIT-I: Typical DSP Algorithms, DSP Application Demands and scaled CMOS Technologies, Representations of DSP algorithms, Dataflow graph representations, loop bound and iteration bound, iteration bound of multirate data-flow graphs UNIT-II: Pipelining of FIR Digital Filters, Parallel processing, pipelining and parallel processing for low power, retiming techniques, Unfolding: algorithm, properties, critical path, applications, Folding: transformation, register minimization in folding architectures, folding of multirate systems UNIT-III: Systolic array design methodology, FIR systolic arrays, selection of scheduling vector, matrix multiplication and 2D systolic array design, cook-toom algorithm, winograd algorithm, iterated convolution, cyclic convolution, design of fast algorithm by inspection UNIT-IV: Parallel FIR filters, Discrete Cosine Transform and Inverse DCT, Parallel architectures for rank-order filters, pipeline interleaving in digital filters, pipelining in 1st order IIR Digital filters, pipelining in higher-order IIR digital filters, parallel processing for IIR filters, low-power IIR filters UNIT-V: Parallel multipliers, interleaved floor-plan and bit-plane-based digital filters, bit-serial multipliers, bit-serial filter design and implementation, canonic signed digit arithmetic, distributed arithmetic, redundant number representations, carry-free radix-2 addition and subtraction, hybrid radix-4 addition, data format conversion, redundant to non redundant converter UNIT-VI: Synchronous pipelining and clocking styles, clock skew and clock distribution in bit-level pipelined VLSI Designs, wave pipelining, constraint space diagram and degree of wave pipelining, implementation of wave-pipelined systems References/Text Books: 1. U. Meyer-Baese, DSP with FPGA, Springer, 2004. 2. K. K. Parhi, VLSI DSP Systems, Wiley, 2003. Lecture Plan: Unit-I & -II syllabus for MID-I, Unit-III & -IV syllabus for MID-II and Unit-V & -VI syllabus for MID-III examinations. Video Lectures (Web Links): 1. 2. Study Materials (Web Links): 1. 2.						