CVR COLLEGE OF ENGINEERING

(An UGC Autonomous Institution with NAAC 'A' Grade Affiliated to JNTUH)
Vastunagar, Mangalpalli (V), Ibrahimpatan (M), R.R. District
Ph. No:91-8414 – 661601, 661675

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

M. Tech. VLSI System Design R-18 Regulation Course Outcomes

Course Code	Name of the Course	Course Outcomes
M. Tech VLSI I Year- II Semester		
74101	RTL Level System Design	CO1: Learn Verilog HDL and learn to use EDA tools like Cadence, Mentor Graphics and Xilinx CO2: Gain familiarity of Finite state machines, RTL design using reconfigurable logic CO3: Learn about programmable logic devices like CPLDs CO4: Learn about FPGAs and their physical design CO5: Implement different applications with the tool
74102	VLSI Technology and Design	CO1: Review FET fundamentals for VLSI design CO2: Design, draw the layouts of all logic gates & various MOSFET's by using scalable design rules CO3: Know the methods to find delays, power utilized by using different methods of testing CO4: Design different memory cells & arrays, finding different faults by conducting different testing methods CO5: Design the subsystems based on VLSI concepts
74103	Analog and Digital CMOS VLSI Design	CO1: Learn about MOS transistor, Stick diagram and Layout CO2: Learn about Physical design flow and combinational logic CO3: Understand Sequential logic, Fin FET, TFET CO4: Acquire knowledge of different types of Amplifiers and Differential amplifier CO5: Understand different stages of OP Amp and its compensation techniques
74109	Semiconductor Memories Technology	CO1: Select architecture and design semiconductor SRAMs and subsystems CO2: Learn about Advanced DRAM Design ,Architecture, controllers CO3: Know the state of the art memory chip design of non-volatile memories CO4: Learn General Reliability Issues, radiation hardening techniques CO5: Learn about Advanced Memory Technologies and High-density Memory Packing Technologies
74104	Device Modeling	CO1: Understand the different semiconductor physics concepts CO2: Understand the SPICE models, small signal, large signal and dynamic models CO3: Learn MOS device equations and MOS spice models CO4: Learn the different fabrication techniques CO5: Understand the concept of modeling of hetero junction diodes.
74105	Embedded System Design	CO1: Understand an embedded system and to know its applications CO2: Learn the processing elements used in embedded systems CO3: Understand embedded firmware CO4: Knows the use of RTOS in embedded systems CO5: Learn different task communication techniques in RTOS
74106	Design of Fault Tolerance Systems	CO1: Learn the fundamental concepts in fault tolerant design

		CO2: Acquire the knowledge of design requirements for self-check in circuits CO3: Learn about design for testability rules and techniques for combinational circuits CO4: Design and Implement built in self-test. CO5: Acquire the knowledge of Boundary scan architectures
74107	Image and Video Processing	CO1: Learn image representation, filtering, compression CO2: Learn the basics of video processing, representation, motion estimation CO3: Understand the representation of video CO4: Understand the principles and methods of motion estimation CO5: Understand the principles of 2-D Motion estimation in image processing.
74108	Algorithms For VLSI Design Automation	CO1: Understand the general design process of modern VLSI chips CO2: Understand various algorithms (Partitioning, Placement, Floor planning) used in VLSI CO3: Build capability to route in VLSI chips with the help of algorithms CO4: Understand MCM, FPGA physical design based algorithms CO5: Get the knowledge of ESD protection, clock distribution in VLSI chips
78101	Research Methodology and IPR	Understand research problem formulation and analyze research related information. CO2: Follow research ethics CO3: Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity. CO4: Understanding importance of intellectual property rights. CO5: Understand the importance of patent rights and developments in IPR.
74131	RTL Simulation and Synthesis with PLDs Lab (Lab I)	CO1: Identify, formulate, solve and implement problems in signal processing, communication systems etc. using RTL design tools CO2: Use EDA tools like Cadence, Mentor Graphics and Xilinx
74132	VLSI Physical Design Lab (Lab II)	CO1: Identify, formulate, solve and implement different digital circuits CO2: Implement digital circuits using Cadence/ Synopsys/ Equivalent CAD tools.
M. Tech VLSI I Year- II Semester		
74201	Low Power VLSI Design	CO1: Identify the sources of power dissipation in digital IC systems & understand the impact of power on system performance and reliability CO2: Learn about different low power circuit techniques CO3: Understand low power clock distribution networks CO4: Learn about different power minimization techniques and circuit design styles CO5: Learn about low power memories, their implementation
74202	VLSI Design Verification and Testing	CO1: Familiarity of Front-end design and verification techniques CO2: Learn about different data types, arrays, Queues and Lists CO3: Understand tasks, functions, void functions, and statements CO4: Understand about basic OOP, its classes, and objects CO5: Learn about randomization in System Verilog, its blocks, and functions.
74203	System On Chip Architectures	CO1: Design System on Chip different processors. CO2: Acquire knowledge of different internal bus architectures

		CO3: Understand AES algorithm and JPEG compression implementation in SoC. CO4: Know how the system forms with the lot of components and has majority about system level interconnections CO5: Introduce hardware and software programmability verses performance
74205	VLSI Signal Processing	CO1: Implement DSP algorithms, DFG representation, pipelining and parallel processing approaches CO2: Understand retiming techniques, folding and can solve register minimization path problems CO3: Understand different Systolic Array Design Methodology like FIR Systolic Arrays, 2D Systolic Array Design CO4: Design Pipelined, parallel recursive and adaptive filters, Digital Lattice Filters CO5: Understand Numerical strength reduction
74206	Digital Signal Processors and Architectures	CO1: Design, using Matlab-based filter design techniques, FIR and IIR digital filters CO2: Program and debug real-time signal processing algorithms in assembly language on a digital signal processor. CO3: Multidisciplinary teams, identify an useful DSP application, and then plan, design, implement and verify for a digital signal processor. CO4: Give an overview of entire digital signal processing techniques i.e. convolution, DFT, FFT, IIRFIR filters. The fixed and floating-point representation, different types of errors introduced during A-D and D-A converter stage. CO5: Introduce the DSP computational building blocks and special types of addressing modes compared to normal microprocessor.
74207	ASIC Design	CO1: Be familiar with ASIC designs CO2: Learn about library cell design, library architecture CO3: Understand different types of simulation, models and verification CO4: Learn about physical design, different CAD tools, their methods and algorithms CO5: Understand routing, planning and placement
74208	Scripting Languages	CO1: Understand the characteristics and uses of scripting languages CO2: Learn the different features of Advanced Perl CO3: Acquire knowledge of TCL philosophy and different features CO4: Learn about advanced TCL CO5: Get knowledge of object-oriented programming concepts
74209	Hardware Software Co-Design	CO1: Study the need of different target architectures and co-design to solve engineering, communication and other problems. CO2: Analysis and extension of existing compilers and languages to system level co-design models for creation and using of modern tools CO3: Design mixed hardware-software systems and the design of hardware-software interfaces CO4: Focus on common underlying modeling concepts and the trade-offs between hardware and software components CO5: Learn about System –level specification, design representation for system level synthesis, system level specification languages
74231	Analog And Digital CMOS VLSI Design Lab(Lab- III)	CO1: Design digital and analog Circuits using CMOS CO2: Use EDA tools like Cadence, Mentor Graphics and other open source software tools like Ngspice.

74232	VLSI Design Verification and Testing Lab (Lab - IV)	CO1: Verify increasingly complex designs more efficiently and effectively. CO2: Use EDA tools like Cadence, Mentor Graphics
74233	Technical Seminar	CO1: Collection and review of research material from literature CO2: Analysis of concepts in multi-disciplinary research areas CO3: Preparation and presentation of technical topics with decent communication skills structures with suitable examples
M. Tech VLSI II Year- I Semester		
74301	Design For Testability	CO1: Identify the role of testing and understand different types of testing CO2: Differentiate between logic simulation and fault simulation, choose the algorithm that suits the given design for design verification and test evaluation CO3: Understand the testability measures and estimate the difficulty in testing a given design CO4: Learn and use various techniques for chip level Built-In Self Test design CO5: Understand the use of JTAG boundary scan
74302	Physical Design Automation	CO1: Familiarize with the basics of automation process and various physical designs CAD tools CO2: Develop and enhance the existing algorithms and computational techniques for physical design process of VLSI systems CO3: Develop layouts for VLSI circuits and undergoing various physical design steps like placement and Partitioning CO4: Understand all types of routing techniques CO5: Understand about various compaction algorithms and routing issues
74303	Nanomaterials and Nanotechnology	CO1: To understand the basic science behind the design and fabrication of nano scale systems CO2: To understand and formulate new engineering solutions for current problems and competing technologies for future applications CO3: To be able to learn about Nanolithography and MEMS CO4: To gather detailed knowledge of Carbon Nano tubes CO5: To be able to make inter disciplinary projects applicable to wide areas by clearing and fixing the boundaries in system development
78301	Business Analytics	CO1: Students will demonstrate knowledge of data analytics. CO2: Students will demonstrate the ability of thinking critically in making decisions based on data and deep analytics. CO3: Students will demonstrate the ability to use technical skills in business analytics and predictive analysis. CO4: Student will be able to understand various forecasting and simulation models. CO5: Students will demonstrate the ability to translate data into clear, actionable insights and learn decisions strategies.
78302	Industrial Safety	CO1: After completion of course, students will be able to analysis various industrial hazards. CO2: Students should be able to implement maintenance tools and techniques in manufacturing industry. CO3: Student will be able to use teratology concept in manufacturing industry. CO4: Students will be able to diagnose industrial equipment's like air pump, compressors etc. CO5: Students should be able to design a preventive maintenance schedule for mechanical components in manufacturing industry.

78303	Operations Research	CO1: Students should able to apply the dynamic programming to solve problems of discreet and continuous variables CO2: Students should able to apply the concept of non-linear programming CO3: Students should able to carry out sensitivity analysis CO4: Student should able to model the real world problem and simulate it. CO5: Students should able to solve the real time problem using Linear programming problem techniques.
78304	Cost Management of Engineering Projects	CO1: Understand the parameters involved in the strategic cost management process. CO2: Comprehend the technical and non-technical activities involved in the Project Management. CO3: Understand the relation between project planning and cost analysis. CO4: Understand different types of budgets and application in Civil Engineering projects CO5: Understand different costing methods and valuation techniques for different projects.
78305	Composite Materials	CO1: Students will demonstrate the knowledge of reinforcement,&composite performance. CO2: Students will demonstrate the different fibers &mechanical behavior of composites. CO3: Students will demonstrate the knowledge of manufacturing of various metal matrix composites. CO4: Students will demonstrate them manufacturing polymer matrix composites CO5: Students will demonstrate the knowledge of stress, maximum strain & failure criteria
78306	Energy From Waste	CO1: Understand the types of various energy conversion units from waste. CO2: Get the knowledge on the solid waste disposal techniques CO3: Understand the biochemical conversion of various residues. CO4: Familiarize about the step by step process of Biogas Conversion. CO5: Understand E-waste Management
74304	Seminar on Project Work	CO1: Collection and review of research material from literature CO2: Analysis of concepts in multi-disciplinary research areas CO3: Preparation and presentation of technical topics with decent communication skills
74305	Project Work Phase - I	CO1: Apply knowledge to propose solutions to the multi domain and real time systems CO2: Perform data collection, review research literature and project management CO3: Use modern EDA tools and research knowledge for developing cost effective systems CO4: Develop presentation and communication skills
M. Tech VLSI II Year- II Semester		
74401	Project Work Phase - II	CO1: Apply knowledge to propose solutions to the multi domain and real time systems CO2: Perform data collection, review research literature and project management CO3: Use modern EDA tools and research knowledge for developing cost effective systems CO4 Develop presentation and communication skills