VAAGDEVI COLLEGE OF ENGINEERING
AUTONOMOUS
Bollikunta, Khila Warangal (Mandal), Warangal Urban-506 005 (T.S), www.vaagdevi.edu.in

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

VISION OF THE DEPARTMENT

- Towards a Global Knowledge Hub, striving continuously in pursuit of excellence in Education, Research, Entrepreneurship and Technological services to the society in the field of ECE.

MISSION OF THE DEPARTMENT

- To turn out full-fledged Engineers in the field of Electronics & Communication Engineering with an overall back-ground suitable for making a successful career either in industry/research or higher education in India and abroad.
- Imparting total quality education to develop innovative, entrepreneurial and professionals fit for globally competitive environment. Fostering product oriented research for establishing self-sustaining creative centres in ECE to serve the societal needs.

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Program Educational Objectives (PEOs)

M.Tech -VLSI System Design

- **PEO1:** Graduates will attain successful professional careers by applying their Engineering skills in VLSI design to the challenges in industry, academia or in the pursuit of other fields.
- **PEO2:** Graduates will engage in lifelong learning, adapt to evolving technology, work in multidisciplinary research design innovative products and solutions and become entrepreneurs.
- **PEO3:** Graduates will practice professional ethics, communicate effectively, emerge as leaders in chosen fields and be socially responsible.
- **PEO4:** Continue the personal development through professional study and self learning.

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Program Outcomes (POs)

M.Tech VLSI System Design:

Upon Successful completion, students will have the knowledge and skills to:

- **PO1:** An ability to Identify, formulate, and analyze VLSI design problems.
- **PO2:** An ability to design a program, process, component or circuit of VLSI systems to meet desired specifications with realistic constraints.
- **PO3:** An ability to use the techniques, skills and modern EDA tools necessary for design and test of VLSI circuits.
- **PO4:** An ability to design a VLSI system sustainable to social and environmental issues.
- **PO5:** An ability to understand steps and theory of fabrication.

Program Specific Outcomes (PSOs)

M.Tech - VLSI System Design:

- **PSO1:** To Identify, formulate and analyze technical problems in different areas like semiconductor technologies, VLSI signal verification and design verification and testing.
- **PSO2:** To Design and implement VLSI architectures using CPLD & FPGA.
- **PSO3:** To use the techniques, Skills, modern Electronic Design Automation tools to evaluate and analyze the performance of the systems in VLSI domain.

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Course Outcomes for M.Tech – VLSI SYSTEM DESIGN (R18) for the year 2018-19 onwards

Course Outcome	**Year/Semester I/I Sem**	**Subject Name (Subject Code)** CMOS DIGITAL INTEGRATED CIRCUIT DESIGN (M18VL01)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Relate, compare, interpret and make the use of the best CMOS design techniques for implementation, analysis & design of Combinational MOS logic circuits.		
2	Relate, compare, interpret and make the use of the best CMOS design techniques for implementation, analysis & design of Sequential MOS logic circuits.		
3	Know & tell different types of memories and compare performance evaluation of each memory modules so they can be able to think & justify how to improve performance by taking different structures.		
4	Define, simplify & justify which dynamic logic circuit can be used investigate CMOS circuits.		
5	Recommend various CMOS techniques and also other device technologies based on circuit constraints requirement.		
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** CMOS ANALOG INTEGRATED CIRCUIT DESIGN (M18VL02)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Define the parameters of MOS Devices & can predict the performance or behavior of Analog VLSI circuit.		
2	Use mathematical models of MOS transistors to evaluate their behavior in analog circuits & selects suitable design approaches while trading off conflicting requirements		
3	Analyze & characterize analog devices and systems & Designing CMOS analog circuits to achieve performance specifications		
4	Understand design issues related to analog VLSI system 7&working of MOS based data converter circuits.		

5	Make the significant use of knowledge of subject in research or on project in VLSI domain.		
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** DIGITAL SYSTEM DESIGN USING HDL(M18VL03)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Design and analyze combinational, sequential and arithmetic circuits using HDL.		
2	Understand digital system design flow, timing, synthesis and FPGA implementation issues.		
3	Solve engineering problems in the area of digital system design & Examine or Inspect for an optimum layout for IC layout at VLSI backend design.		
4	Design, analyze & can predict the performance characteristics of logic gates using NMOS, PMOS & CMOS technology at VLSI backend design.		
5	Tell an optimum trade with respect to three basic parameters of VLSI design for VLSI circuit at frontend or backend VLSI design		
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** VLSI SIGNAL PROCESSING (M18VL04)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Apply the concepts of pipelining, parallel processing, retiming, folding and unfolding to optimize digital signal processing architectures		
2	Use of proper techniques for parallel processing design for scaling and round off noise computation		
3	Apply all techniques to improve implementations of several DSP algorithms, using both ASICs and off –the -shelf programmable digital signal processors		
4	Design high-speed, low-area, and low-power VLSI systems for a broad range of DSP applications		
5	Minimize the computational complexity using fast convolution algorithms & Make the significant use of knowledge of subject in research or on project in VLSI domain		
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** VLSI TECHNOLOGY (M18VL05)	**L: 3 T: 0 P: 0 C: 3**

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After the completion of this course, the students should be able to			
1	Build circuits using IC's.		
2	In depth knowledge of applying the concepts in real time applications.		
3	Understand the main elements of hierarchical IC design namely interested circuit technology, approaches to system design, architectural issues.		
4	Design implementation and layout & Use of tools for efficient designing.		
5	Make the significant use of knowledge of subject in research or on project in VLSI domain.		
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** ALGORITHM FOR VLSI DESIGN AUTOMATION(M18VL06)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Describe and formulate the flow of VLSI Design for any application.		
2	Explain the algorithms for partitioning, floor planning, placement and routing the digital designs at frontend level & at backend VLSI Design level.		
3	Compare the various scheduling algorithms & Analyze & solve the issues related to logic synthesis & verification		
4	Explain the algorithms for partitioning, floor planning, placement and routing the MCM modules		
5	Make significant contribution in the research in based on design of CAD tool for VLSI design		
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** EMBEDDED SYSTEM DESIGN (M18VL07)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Know the Basic Concept of Embedded Systems.		
2	Interpret the difference between Microcontrollers and Microprocessors.		
3	Apply the Software for Embedded System Design & concepts of Embedded OS.		
4	Explain and apply the concept of Embedded Firmware, RTOS Based Embedded System Design and Task function.		

5	Make significant contribution in the research in applications based on embedded system design.		
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** DEVICE MODELING (M18VL08)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Understand the physics of and design elements of silicon MOSFETs.		
2	Explain the equations, approximations and techniques available for deriving a model with specified properties, for a general device characteristic with known qualitative theory		
3	Analyze the performance issues & inherent trade off involved in system design Offer clues to qualitative understanding of the physics of a new device and conversion of this understanding into equations.		
4	Utilize semiconductor models to analyze carrier densities and carrier transport & Simulate characteristics of a simple device using MATLAB, SPICE and SYNOPSYS		
5	Understand and analyze the inner working of semiconductor p-n diodes, Schottky barrier diodes and advanced MOSFET technology		
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** ENGLISH FOR RESEARCH PAPER WRITING (M18AC01)	**L: 2 T: 0 P: 0 C: 0**
After the completion of this course, the students should be able to			
1	Understand the nuances of language and vocabulary in writing a Research Paper		
2	Develop the content, structure and format of writing a research paper		
3	Analyze and practice writing a Research Paper		
4	Enable the students to plan for original research papers without subjected to plagiarism		
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** RESEARCH METHODOLOGY (M18MC01)	**L: 2 T: 0 P: 0 C: 2**
After the completion of this course, the students should be able to			
1	Develop an understanding of IPR/ research methodology in the process of creation of patents through research		

2	Develop further research capabilities		
3	Design Important Concepts Related to Research Design		
4	Learn better report writing skills and Patenting		
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** HDL PROGRAMMING LABORATORY (M18VL09)	**L: 0 T: 0 P: 4 C: 2**
After the completion of this course, the students should be able to			
1	Apply the knowledge in Simulation and Synthesis of Digital Circuits.		
2	Design Various Combinational and Sequential circuits using Verilog HDL & HDL		
3	Explain the System Modeling with Tasks and Functions.		
4	Design of digital circuits using FPGA/CPLD boards.		
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** Digital IC Design Laboratory (M18VL10)	**L: 0 T: 0 P: 4 C: 2**
After the completion of this course, the students should be able to			
1	Design CMOS inverters, logic circuits and transmission gates to specifications.		
2	Design latches and flip-flops asthe basic circuit for Random-Access- Memory (RAM) and Read-Only-Memory (ROM) cells.		
3	Understand the Design of Bi-CMOS Inverter, logic circuits.		
4	Design post Layout of Different logic circuits.		
Course Outcome	**Year / semester I/II Sem**	**Subject Name (Subject Code)** CMOS Mixed Signal Circuit Design (M18VL11)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Build mixed signal circuits like DAC, ADC, PLL etc &Gain knowledge on filter design in mixed signal mode &To acquire knowledge on design different architectures in mixed signal mode.		
2	Analyze digital test and linear test engineers to the mixed signal world by teaching the basics of analog and mixed signal test methods. Sampling Theory, Frequency Domain Testing, and Digital Signal Processing		

3	Apply these fundamental concepts to different test methods and data validation for mixed signal parameters together with debugging, noise reduction and device interface techniques.		
4	Deal with the theory and design skills of CMOS op-amps, voltage reference circuits, switched capacitor circuits, sample-and- hold circuits, and A/D & D/A converters used in modern communication systems and consumer electronic products.		
5	Design of core mixed-signal IC blocks: comparators and data converters & System level design flow: top-down and bottom-up design methodologies		
Course Outcome	**Year / semester I/II Sem**	**Subject Name (Subject Code)** VLSI Design Verification and Testing (M18VL12)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Gain knowledge on digital testing as applied to VLSI design &Acquire knowledge on testing of algorithms for digital circuits.		
2	Learn various testing methods for digital circuits & process of modern VLSI design, verification, and test.		
3	Develop and understanding for the advanced design concepts in modern VLSI technologies & Learn self-checking circuits where faults are detected by subcircuit called checker		
4	Gain the knowledge of testing and verification in VLSI design process, ATPG concepts for combinational and sequential circuits		
5	Specific techniques for designing high-speed, low-power, and easily-testable circuits		
Course Outcome	**Year / semester I/II Sem**	**Subject Name (Subject Code)** Low Power VLSI Design (M18VL13)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Design Low power CMOS designs, for digital circuits & Gains knowledge on low power circuit design styles for VLSI circuits.		
2	Understand power estimation and optimization methods for VLSI circuits & causes of the power dissipation in digital ICs.		
3	Exploring the low power circuits and architectures for VLSI system.		
4	Understand the concept of VLSI circuit of low power operation & case study of low power design		
5	Design various circuits for optimize power		
Course Outcome	**Year / semester I/II Sem**	**Subject Name (Subject Code)** Optimization Technique In VLSI Design (M18VL14)	**L: 3 T: 0 P: 0 C: 3**

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After the completion of this course, the students should be able to			
1	Gain knowledge on Optimization techniques involved in VLSI circuits.		
2	Analyze methods of optimization to engineering students, including linear programming, nonlinear programming, and heuristic methods		
3	Understand balance between theory, numerical computation, problem setup for solution by optimization software, and applications to engineering systems.		
4	Studies General optimization algorithm; necessary and sufficient conditions for optimality		
5	Demonstrate the Concept of Genetic Algorithms and Routing Procedures		
Course Outcome	**Year / semester I/II Sem**	**Subject Name (Subject Code)** High Speed VLSI Design (M18VL15)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Gain knowledge on circuits and techniques involved in high speed VLSI circuits.		
2	Explore various design strategies to be followed for designing a high speed VLSI circuits.		
3	Understand the logic styles for designing a high speed VLSI circuit & Learn the basics of VLSI design for high speed processing		
4	Apply methods for logical efforts, logic styles, latching strategies, interface techniques and related issues.		
5	Acquire knowledge about High Speed VLSI Circuits Design & Learn the basics of VLSI design for high speed processing		
Course Outcome	**Year / semester I/II Sem**	**Subject Name (Subject Code)** ASIC Design (M18VL16)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	To learn the fundamentals of ASIC and its design methods		
2	To gain knowledge on programmable architectures for ASICs & physical design of ASIC		
3	To prepare the student to be an entry level industrial standard cell ASIC or FPGA designer		
4	To give the student an understanding of issues and tools related to ASIC/FPGA design.		
5	Prepare the student for implementation, including timing, performance and power optimization, verification and manufacturing test		
Course	**Year / semester**	**Subject Name (Subject Code)**	**L: 3 T: 0 P: 0 C: 3**

Outcome	**I/II Sem**	System On Chip Architecture (M18VL17)	
After the completion of this course, the students should be able to			
1	Learn System on chip fundamentals, their applications		
2	Gain knowledge on SOC design & computation models of SOCs.		
3	Learn the basic concepts of NoC design by studying the topologies, router design and MPSoC styles & sample routing algorithms on a NoC with deadlock and livelock avoidance		
4	Understand the role of system-level design and performance metrics in choosing a NoC design		
5	Understand the relationship between semiconductor technology, computer architecture and computer networking in the design of the communication network for a MPSoC or a many-core design		
Course Outcome	**Year / semester I/II Sem**	**Subject Name (Subject Code)** Semiconductor Memory Design & Testing (M18VL18)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Know the design of MOS memories and the various precautionary methods to be used in their design		
2	Learn overview of memory chip design, DRAM circuits, voltage generators, performance analysis and design issues of ultra-low voltage memory circuits		
3	Acquire knowledge about High-Performance Subsystem Memories & Analyse RAM and DRAM Design		
4	Demonstrate Advanced Memory Technologies and High-density Memory Packing Technologies & Gains knowledge on various testing methods of semiconductor memories		
5	Get an overview on reliability of semiconductors and their testing		
Course Outcome	**Year / semester I/II Sem**	**Subject Name (Subject Code)** Stress Management (M18AC02)	**L: 2 T: 0 P: 0 C: 0**
After the completion of this course, the students should be able to			
1	Enhance of Physical strength and flexibility.		

2	Learn to relax and focus.		
3	Relieve physical and mental tension		
4	Improve work performance/ efficiency.		
Course Outcome	**Year / semester I/II Sem**	**Subject Name (Subject Code)** Analog IC Design Laboratory (M18VL19)	**L: 0 T: 0 P: 4 C: 2**
After the completion of this course, the students should be able to			
1	Design Various Characteristics of MOS Logic		
2	Design Various Amplifier circuits using CMOS Logic		
3	Design Various circuits using Different Logic Styles		
4	Design Layout of Different logic circuits		
Course Outcome	**Year / semester I/II Sem**	**Subject Name (Subject Code)** Mini Project (M18VL21)	**L: 2 T: 0 P: 0 C: 2**
After the completion of this course, the students should be able to			
1	Demonstrate a sound technical knowledge of their selected project topic.		
2	Identify and summarize an appropriate list of literature review, analyze previous researchers' work and relate them to current project.		
3	Present the project outlining the approach and expected results using good oral and written presentation skills.		
4	Apply critical and creative thinking in the design of engineering projects not only limited to electronics and communication engineering domain but if possible to other interdisciplinary domains as well.		
5	Design and develop a functional product prototype while working in a team		
6	Communicate with engineers and the community at large in written and oral forms.		
7	Consider the business context and commercial positioning of designed devices or systems		
Course Outcome	**Year / semester I/II Sem**	**Subject Name (Subject Code)** Mixed Signal VLSI Laboratory (M18VL20)	**L: 0 T: 0 P: 4 C: 2**
After the completion of this course, the students should be able to			

1	Design Various Amplifier circuits using CMOS Logic		
2	Design Various Complex circuits using Different Logic Styles		
3	Design Layout of Different logic circuits		
4	Digital/analog circuits are to be designed and implemented using CAD tools.		
Course Outcome	**Year / semester II/I Sem**	**Subject Name (Subject Code)** High Speed VLSI Architectures for DSP Applications (M18VL22)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Know about the graph representations of DSP algorithms, Convolution algorithms and the concept of parallel recursive and adaptive filters		
2	Analyze The graph representations of DSP algorithms, Convolution algorithms & concept of parallel recursive and adaptive filters		
3	Gain the idea of scaling and round off noise and about digital lattice filter structures		
4	Contribute the knowledge in the design of parallel recursive and adaptive filters		
5	Demonstrate variable description of digital filters and digital lattice filter structures		
Course Outcome	**Year / semester II/I Sem**	**Subject Name (Subject Code)** Nano materials & Nano Technology (M18VL23)	**L: 3 T: 0 P: 0 C:3**
After the completion of this course, the students should be able to			
1	Understand the fundamental function of cells, and how nanotechnologies interact & Describe the various applications of nanotechnology in biotechnology & medicine.with cells.		
2	Explain the process of self-assembly – from single molecules into nanoparticles		
3	Describe and explain how nanoparticles are fabricated and characterized & principles of loading small molecule drugs, proteins or nucleic acids (DNA/RNA) into nanoparticles		
4	Describe and explain the scientific basis and medical benefits for using nanotechnology for treating diseases		
5	Demonstrate how nanotechnology-based innovation can drive better medicine and a stronger economy		
Course	**Year / semester**	**Subject Name (Subject Code)**	**L: 3 T: 0 P: 0 C: 3**

Outcome	**II/I Sem**	RF Circuit Design (M18VL24)	
After the completion of this course, the students should be able to			
1	Understand important and unique engineering issues at microwave and millimeter wave frequencies.		
2	Learn microwave network theory and the use of scattering matrix		
3	Learn design criteria for waveguide and coaxial microwave components.		
4	Learn the application of these components in the design of useful systems such as radars, receivers, etc.		
5	Work in small teams and design, fabricate and test a useful microwave component or device, which may be designed using microstripline technology.		
Course Outcome	**Year / semester II/I Sem**	**Subject Name (Subject Code)** Soft Computing Techniques (M18CS12)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Identify and describe soft computing techniques and their roles in building intelligent machines		
2	Recognize the feasibility of applying a soft computing methodology for a particular problem		
3	Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems .		
4	Apply genetic algorithms to combinatorial optimization problems & neural networks to pattern classification and regression problems		
5	Effectively use existing software tools to solve real problems using a soft computing approach .		
Course Outcome	**Year / semester II/I Sem**	**Subject Name (Subject Code)** Graph Theory & Optimization Techniques **(**M18MA02**)**	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Understand the concepts of probability & statics		
2	Identify the strength and weakness of different theories		

3	Design and employ appropriate method for solving computing problems		
4	Analyze and compare the methods.		
5	Solve computing problems independently.		
Course Outcome	**Year / semester II/I Sem**	**Subject Name (Subject Code)** Waste Management(M18CE27)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Acquire the knowledge of waste management		
2	Explain solid waste disposal techniques		
3	Acquire the knowledge of Bio medical waste disposal techniques		
4	Acquire the knowledge of e- waste disposal techniques		
5	Select the appropriate method for solid waste collection, transportation, redistribution and disposal		
Course Outcome	**Year / semester II/I Sem**	**Subject Name (Subject Code)** Dissertation Phase-I (M18VL25)	**L: 0 T: 0 P: 20 C:10**
After the completion of this course, the students should be able to			
1	Demonstrate a sound technical knowledge of their selected project topic.		
2	Identify and summarize an appropriate list of literature review, analyze previous researchers' work and relate them to current project.		
3	Formulate clearly a work plan and procedures.		
4	Present the project outlining the approach and expected results using good oral and written presentation skills.		
5	Undertake problem identification, formulation and solution.		
Course Outcome	**Year / semester II/II Sem**	**Subject Name (Subject Code)** Dissertation Phase-II (M18VL26)	**L: 0 T: 0 P: 32 C:16**
After the completion of this course, the students should be able to			
1	Apply critical and creative thinking in the design of engineering projects not only limited to electronics and communication engineering domain but if possible to other interdisciplinary domains as well.		
2	Demonstrate the knowledge, skills and attitudes of a professional engineer when		

	working in a team
3	Design and develop a functional product prototype while working in a team
4	Communicate with engineers and the community at large in written and oral forms.
5	Consider the business context and commercial positioning of designed devices or systems