VAAGDEVI COLLEGE OF ENGINEERING

Autonomous

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Course Outcomes for M.Tech – VLSI SYSTEM DESIGN (R20) for the academic year 2020-2021 onwards

Course Outcome	**Semester I Sem**	**CMOS Digital Integrated Circuit Design (M20VL01)**	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Define the basic of CMOS technology.		
2	Relate, compare, interpret and make the use of the best CMOS design techniques for implementation, analysis & design of Combinational& 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	**Semester I Sem**	**CMOS Analog Integrated Circuit Design (M20VL02)**	**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	Analyze & characterize analog devices and systems to achieve performance specifications.		
3	Understand the different topologies involved in the CMOS amplifier design.		
4	Understand design issues & measurement techniques related to CMOS operational amplifier design.		
5	Design & analyze the comparator for different topologies to achieve performance Specifications.		
Course Outcome	**Semester I Sem**	**(Program Elective-I) Digital System Design using HDL (M20VL03)**	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Understand the basic concepts of Verilog HDL, digital system design flow, timing, and synthesis and FPGA implementation issues.		
2	Understand the basics of MOS transistors required for MOS based circuit & layout design.		
3	Know the different design technique for CMOS Combinational Circuit Design & able to select suitable design technique for given performance specification.		
4	Get an idea of the different design technique for CMOS Sequential Circuit Design & able to select suitable design technique for given performance specification.		
5	Understand the design flow from simulation to synthesizable / implementation level for VLSI based system design.		
Course Outcome	**Semester I Sem**	**(Program Elective-I) VLSI Signal Processing (M20VL04)**	**L: 3 T: 0 P: 0 C: 3**

After the completion of this course, the students should be able to			
1	Understand the overview of DSP concepts.		
2	Apply the concepts of iteration bound, pipelining& parallel processing for FIR filter design.		
3	Understand techniques of fast convolution & algorithmic strength reduction in the filter structures.		
4	Perform pipelining & parallel processing on recursive filter structures to achieve high speed & low power.		
5	Use of proper techniques for parallel processing design for scaling and round off noise.		
Course Outcome	**Semester I Sem**	**(Program Elective-I) VLSI Technology (M20VL05)**	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Understand the different MOS technologies.		
2	Appreciate the various techniques involved in the VLSI fabrication process.		
3	Analyze the concepts, transistor structures, interconnects & design rules related to layout design in VLSI.		
4	Understand the different doping & diffusion mechanism.		
5	Understand the nuances of design rules, scaling, transistors, resistors, capacitors & packaging of VLSI devices.		
12	**Semester I Sem**	**(Program Elective-II) Algorithms For VLSI Design Automation (M20VL06)**	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Understand the preliminaries required for VLSI system design.		
2	Apply the general purpose methods for combinational optimization.		
3	Understand the concept of Layout Compaction, Placement, Floor planning& Routing, modeling & simulation involved in VLSI system design.		
4	Analyze the concept related to synthesis & verification in VLSI system design.		
5	Analyze the design cycle of for FPGA and partitioning-routing concepts related to it.		
6	Explain the algorithms for partitioning, floor planning, placement and routing the MCM modules.		
Course Outcome	**Semester I Sem**	**(Program Elective-II) Embedded System Design (M20VL07)**	**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	Understand the core of typical embedded system.		
3	Know the embedded firmware.		
4	Get introduced to RTOS based Embedded system design & related mechanism.		
5	Appreciate the methods for task communication for the development of a typical embedded.		
Course Outcome	**Semester I Sem**	**(Program Elective-II) Device Modeling (M20VL08)**	**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	Understand & study the physics behind the operation of integrated diodes & integrated bipolar transistor.		
3	Analyze& study the physics behind the operation of integrated diodes & integrated bipolar transistor.		
4	Understand the VLSI fabrication techniques.		
5	To design circuits using Hetero Junction Devices with physical insight of their functional.		
Course Outcome	**Semester I Sem**	**English For Research Paper Writing (M20AC01)**	**L: 2 T: 0 P: 0 C: 0**
After the completion of this course, the students should be able to			
1	Develop the content, structure and format of writing a research paper.		
2	Understand the research methodology in research paper writing.		
3	Analyze and practice writing a Research Paper.		
4	Know how to & where to get published the research work.		
Course Outcome	**Semester I Sem**	**Research Methodology (M20MC01)**	**L: 2 T: 0 P: 0 C: 2**
After the completion of this course, the students should be able to			
1	Appreciate the flow of research methodologies in the research work.		
2	Design Important Concepts Related to Research Design.		
3	Learn better report writing skills and Patenting.		
4	To write a Research Proposal and Research Report & Research Grant Proposal.		
5	Understand the importance of Intellectual Property.		
Course Outcome	**Semester I Sem**	**HDL Programming Laboratory (M20VL09)**	**L: 0 T: 0 P: 4 C: 2**
1	Apply the knowledge in Simulation and Synthesis of Digital Circuits.		
2	DesignVariousCombinationalandSequentialcircuitsusingVerilogHDL&HDL.		
3	Explain the System Modeling with Tasks and Functions.		
4	Design of digital circuits using FPGA/CPLD boards.		
Course Outcome	**Semester I Sem**	**Digital IC Design Laboratory (M20VL10)**	**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 as the 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	**Semester II Sem**	**CMOS Mixed Signal Circuit Design (M20VL11)**	**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	**Semester II Sem**	**VLSI Design Verification and Testing (M20VL12)**	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Understand the need for testing in VLSI & different testing issues.		
2	Gain the knowledge of testing and verification in VLSI design process, ATPG concepts for combinational and sequential circuits.		
3	Apply knowledge of testability measures for testing of digital systems.		
4	Apply knowledge of test-pattern generation & Design for testability techniques for testing of digital systems.		
5	Understanding boundary scan standards & testing techniques for CMOS IC's.		
Course Outcome	**Semester II Sem**	**(Program Elective-III) Low Power VLSI Design (M20VL13)**	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Understand the need for low power circuit design & sources of power dissipation in VLSI system.		
2	Appreciate the concept of Low-Power Design Approaches in VLSI system design.		
3	Design low voltage low power adders for given performance specification.		
4	Optimize the power of multiplier using different strategies at different levels of design.		
5	Design low-power CMOS memories using various strategies at different design level.		
Course Outcome	**Semester II Sem**	**(Program Elective-III) Optimization Technique In VLSI Design (M20VL14)**	**L: 3 T: 0 P: 0 C: 3**
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	**Semester II Sem**	**(Program Elective-III) High Speed VLSI Design (M20VL15)**	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Appreciate the different clocking logic styles in VLSI system design as per specification.		
2	Understand circuit design margining & design variability for VLSI circuit.		
3	Appreciate the concept of latching strategies to optimize the speed of the system.		
4	GainknowledgeoninterfacetechniquesinvolvedinhighspeedVLSIcircuits.		
5	Analyze the clocking styles in design to optimize the timing issues to support high speed processing.		
Course Outcome	**Semester II Sem**	**(Program Elective-IV) ASIC Design (M20VL16)**	**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	Understand the programmable ASIC Logic Cells & selection of suitable ASIC Logic cells for design.		
4	Analyze ASIC floor planning, placement and routing in VLSI Design.		
5	Appreciate concept of optimization algorithms in the design of an efficient layout.		
Course Outcome	**Semester II Sem**	**(Program Elective-IV) System On Chip Architecture (M20VL17)**	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Apply the knowledge of SoC architecture & organization.		
2	Analyze various processor microarchitecture & design trade-off for SoC.		
3	Understand the memory design for SoC.		
4	Evaluate interconnect structure for different topologies.		
5	Design Soc based Embedded system on FPGA.		
Course Outcome	**Semester II Sem**	**(Program Elective-IV) Semiconductor Memory Design & Testing (M20VL18)**	**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 & Analyze 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	**Semester II Sem**	**Stress Management (M20AC02)**	**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	**Semester II Sem**	**Analog IC Design Laboratory (M20VL19)**	**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	**Semester II Sem**	**Mixed Signal VLSI Laboratory (M20VL20)**	**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	**Semester II Sem**	**Mini Project (M20VL21)**	**L: 0 T: 0 P: 4 C: 2**
After the completion of this course, the students should be able to			
1	Use fundamental knowledge and skills in engineering and apply it effectively on a project.		
2	UnderstandtheProductDevelopmentProcessincludingbudgetingthroughMiniProject.		
3	Plan for various activities of the Miniproject.		
4	Inculcate electronic hardware and software implementation skills.		
5	Manage any disputes and conflicts within and outside individually.		
6	Prepare a technical report based on the Miniproject.		
7	Deliver technical seminar based on the Mini Project work carried out.		
Course Outcome	**Semester III Sem**	**(Program Elective-V) High Speed VLSI Architectures for DSP Applications (M20VL22)**	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Apply the concept of unfolding for optimization of critical paths in the VLSI system design.		
2	Design Multiplier architectures in optimized way for given specification in VLSI Design.		
3	Apply the redundant arithmetic for optimization of adder & multiplier block generally used in digital signal processing application.		
4	Analyze the use of synchronous & asynchronous pipelining in to optimize the		

	performance of High Speed VLSI Design.		
5	Understand the low power VLSI DSP system.		
Course Outcome	**Semester III Sem**	**(Program Elective-V) Nano materials & Nano Technology (M20VL23)**	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Understand the limitations of the MOSFETs & potential of nanoelectronics.		
2	Show a deeper understanding of the relation between novel behavior of nanoelectronics devices and quantum behavior of the matter at the nano scale as well as the breakdown of received scaling wisdom.		
3	Understand structures of carbon nanotubes & its applications.		
4	Appreciate the concept of molecular electronics in nanoscale fabrication technologies understand the principle of spintronic.		
Course Outcome	**Semester III Sem**	**(Program Elective-V) RF Circuit Design (M20VL24)**	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Understand the performance parameters / specifications of the RF Circuits.		
2	Design & analyze the filter design.		
3	Understand & evaluate the performance of various specifications of high frequency amplifier design, Mixer, Oscillators & Power Amplifiers.		
4	Understand the source of nonlinearity, noise, process technology & its impact on the parameters of individual blocks of receiver & on receiver performance.		
5	Demonstrate the tools & techniques to evaluate the performance specifications of the RF building blocks.		
Course Outcome	**Semester III Sem**	**(Open Elective) Soft Computing Techniques (M20CS12)**	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Understand the Fundamentals of Neural Networks & Feed Forward Networks.		
2	Design & analyze the Associative Memories & ART Neural Networks.		
3	Understand & evaluate the performance of Fuzzy Logic & Systems.		
4	Understand the Genetic Algorithms.		
5	Design & analyze Hybrid Systems.		
6	Understand Soft Computing concepts, technologies, and applications.		
7	Understand the underlying principle of soft computing with its usage in various application.		
Course Outcome	**Semester III Sem**	**(Open Elective) Graph Theory & Optimization Techniques (M20MA02)**	**L: 3 T: 0 P: 0 C: 3**
1	Understand the various types of graph Algorithms and graph theory properties.		
2	Analyze the NP – complete problems.		
3	Distinguish the features of the various tree and matching algorithms.		
4	Appreciate the applications of digraphs and graph flow.		
5	Understand the linear programming principles and its conversion.		
6	Design and employ appropriate method for solving computing problems.		

Course Outcome	**Semester III Sem**	**(Open Elective) Waste Management (M20SE27)**	**L: 3 T: 0 P: 0 C: 3**
1	Understand how waste management practices protect environmental health and safety.		
2	Apply physical and chemical analysis on municipal solid wastes.		
3	Enhance the route for solid waste collection and transport system.		
4	Develop a method to use energy from solid wastes.		
5	Explain different methods of disposal of hazardous solid waste.		
Course Outcome	**Semester III Sem**	**Dissertation Phase-I (M20VL25)**	**L: 0 T: 0 P: 20 C:10**
After the completion of this course, the students should be able to			
1	In Master's Project Phase-I, the students should select a recent topic from a reputed International Journal, preferably IEEE, ACM, Springer in the field that has direct or indirect relation to the area of specialization.		
2	After conducting a detailed literature survey, they should compare and analyze research work done and review recent developments in the area and prepare an initial design of the work to be carried out as Master's Project.		
3	It is mandatory that the students should refer National and International Journals and conference proceedings while selecting a topic for their Project.		
4	Emphasis should be given for introduction to the topic, literature survey, and scope of the proposed work along with some preliminary work carried out on the Project topic.		
5	Students should submit a copy of Phase-I Project report covering the content discussed above and highlighting the features of work to be carried out in Phase-II of the Project.		
Course Outcome	**Semester IV Sem**	**Dissertation Phase-II (M20VL26)**	**L: 0 T: 0 P: 32 C:16**
After the completion of this course, the students should be able to			
1	Use specialized knowledge and skills in engineering and apply it effectively on a project.		
2	Apply knowledge of the 'real world' situations that a professional engineer can encounter.		
3	Apply critical and creative thinking in the design of VLSI System Design projects.		
4	Demonstrate a sound technical knowledge of selected project topic.		
5	Demonstrate the skills and attitude of a professional engineer.		
6	Summarize an appropriate list of literature review, analyze previous work and relate them to current project.		
7	Deliver technical seminar based on the Project work carried out.		
8	Publish the conducted research work in a National / International Conference or Journal preferably IEEE, ACM, Springer and Scopus indexed/SCI indexed/ESCI.		