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AKSHAYA

COLLEGE OF ENGINEERING AND TECHNOLOGY

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Kinathukadavu, Coimbatore-642109. www.acetcbe.edu.in



DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
M.E. VLSI DESIGN
COURSE OUTCOMES (REGULATION 2021)

SEMESTER I

Course Code / Course Name: VL4153 / Graph theory and optimization techniques

CO No.	Course Outcomes (COs)
C101.1	Apply graph ideas is solving connectivity related problems.
C101.2	Apply fundamental graph algorithms to solve certain optimization problems.
C101.3	Formulate and construct mathematical models for linear programming problems and solve the transportation and assignment problems.
C101.4	Model various real life situations as optimization problems and effect their solution through Non-linear programming.
C101.5	Apply simulation modeling techniques to problems drawn from industry management and other engineering fields.

Course Code / Course Name: RM4151 / Research Methodology and IPR

CO No.	Course Outcomes (COs)
C102.1	Understand and adhere to ethical guidelines, avoiding plagiarism and ensuring data integrity.
C102.2	Develop skills in formulating research questions and designing robust methodologies.
C102.3	Learn techniques for collecting and analyzing data to derive meaningful insights.
C102.4	Understand the process of commercializing research innovations through licensing and collaboration.
C102.5	Examine the impact of intellectual property laws on innovation and economic development.

Course Code / Course Name: VL4151/ Analog IC Design

CO No.	Course Outcomes (COs)
C103.1	Develop amplifiers that meet user specifications, ensuring optimal performance according to requirements.
C103.2	Evaluate the frequency response and noise performance of amplifiers to assess their effectiveness in various conditions.
C103.3	Construct the feedback amplifiers and one-stage operational amplifiers (op-amps) to achieve desired stability and performance.

C103.4	Analyze two-stage operational amplifiers (op-amps) to optimize gain and bandwidth.
C103.5	Evaluate current mirrors and current sinks using MOS devices for efficient operation in circuits.

Course Code / Course Name: VL4152/ Digital CMOS VLSI design

CO No.	Course Outcomes (COs)
C104.1	Apply mathematical methods and circuit analysis models in the analysis of CMOS digital circuits to understand their behavior.
C104.2	Develop models of moderately sized static CMOS combinational circuits to realize specified digital functions, optimizing delay using RC delay models and logical effort.
C104.3	Design sequential logic at the transistor level and analyze trade-offs of sequencing elements, including flip-flops and transparent latches.
C104.4	Understand the design methodology of arithmetic building blocks and their role in digital circuit design.
C104.5	Design functional units such as ROM and SRAM, focusing on their architecture and implementation.

Course Code / Course Name: AP4152 / Advanced digital system design

CO No.	Course Outcomes (COs)
C105.1	Analyze synchronous sequential circuits to understand their behavior and timing requirements.
C105.2	Design asynchronous sequential circuits, considering hazard analysis and race condition minimization.
C105.3	Understand the testing procedures for combinational circuits and PLAs to ensure functional correctness.
C105.4	Design PLDs and ROMs, focusing on architecture and implementation for specific applications.
C105.5	Develop and use programming tools for implementing digital circuits that meet industry standards.

Course Code / Course Name: AP4153 / Semiconductor devices and modeling

CO No.	Course Outcomes (COs)
C106.1	Explore the properties of MOS capacitors.
C106.2	Analyze the various characteristics of MOSFET devices.
C106.3	Describe the various CMOS design parameters and their impact on performance of the device.
C106.4	Discuss the device level characteristics of BJT transistors.
C106.5	Identify the suitable mathematical technique for simulation.

Course Code / Course Name: VL4111 / FPGA Laboratory

CO No.	Course Outcomes (COs)
C107.1	Understand and use the System Verilog RTL design and synthesis features, including data types, literals, procedural blocks, statements, operators, and interfaces.
C107.2	CO2 stimulus, coverage, and dynamic arrays for more effective and efficient verification.

C107.3	Implement higher levels of abstraction in design and verification processes for improved efficiency and clarity.
C107.4	Develop Verilog test environments of significant capability and complexity to validate designs effectively.
C107.5	Integrate scoreboards, multichannel sequencers, and register models to enhance testbench functionality and performance.

Course Code / Course Name: VL4112 / Analog IC design laboratory

CO No.	Course Outcomes (COs)
C108.1	Extract process parameters of CMOS transistors, including threshold voltage and subthreshold slope, using SPICE simulations.
C108.2	Design CMOS inverters and analyze their performance, including VTC curves, transition voltage, and propagation delays.
C108.3	Simulate multi-stage ring oscillators using SPICE, and evaluate their frequency characteristics through FFT analysis.
C108.4	Analyze single-stage amplifier designs, including small-signal voltage gain and biasing conditions for optimal performance.
C108.5	Implement test benches for amplifier circuits and verify performance using SPICE simulations to compare theoretical and actual results.

SEMESTER II

Course Code / Course Name: VL4251 / Design for verification using UVM

CO No.	Course Outcomes (COs)
C109.1	Understand the basic concepts of UVM methodologies and their role in verification, focusing on how UVM enhances testing efficiency and accuracy.
C109.2	Create verification components using UVM to develop effective test environments that ensure thorough and reusable design validation.
C109.3	Generate register layer classes to automate testbench creation, streamlining the process of testing hardware registers in complex verification setups.
C109.4	Develop test benches using UVM to implement various test scenarios, ensuring functionality and reusability in the verification process.
C109.5	Understand advanced peripheral bus test benches and their application in verifying the interaction of peripheral buses within complex designs.

Course Code / Course Name: VL4291 / Low Power VLSI Design

CO No.	Course Outcomes (COs)
C110.1	Estimate the power dissipation of MOS circuits, analyzing the impact of various factors on power consumption.
C110.2	Design and analyze various MOS logic circuits, evaluating their performance and power characteristics.
C110.3	Apply low-power techniques to minimize power dissipation in MOS circuits, ensuring efficient energy consumption.
C110.4	Evaluate the power dissipation of integrated circuits (ICs), understanding the factors contributing to overall power usage.

C110.5	Develop algorithms aimed at reducing power dissipation through software, optimizing energy efficiency in digital systems.
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Course Code / Course Name: VL4292 / RFIC Design

CO No.	Course Outcomes (COs)
C111.1	Estimate the power dissipation of MOS circuits, analyzing the impact of various factors on power consumption.
C111.2	Design various MOS logic circuits, evaluating their performance and power characteristics.
C111.3	Apply low-power techniques to minimize power dissipation in MOS circuits, ensuring efficient energy consumption.
C111.4	Evaluate the power dissipation of integrated circuits (ICs), understanding the factors contributing to overall power usage.
C111.5	Develop algorithms aimed at reducing power dissipation through software, optimizing energy efficiency in digital systems.

Course Code / Course Name: VL4252 / VLSI Testing

CO No.	Course Outcomes (COs)
C112.1	Understand the VLSI testing process, focusing on the techniques and methodologies used to verify circuit functionality.
C112.2	Create logic simulation and fault simulation methods to evaluate the behavior of VLSI circuits under various conditions.
C112.3	Design tests for combinational and sequential circuits to ensure correctness and identify potential faults.
C112.4	Understand the concept of Design for Testability (DFT) and its importance in facilitating effective testing of complex circuits.
C112.5	Execute fault diagnosis in VLSI circuits to identify and isolate issues, ensuring efficient debugging and repair.

Course Code / Course Name: VE4152 / Embedded System Design

CO No.	Course Outcomes (COs)
C113.1	Understand different protocols and their relevance in embedded systems for effective communication and functionality.
C113.2	Apply state machine techniques and design process models to create efficient control systems in embedded applications.
C113.3	Utilize embedded software development tools and RTOS to enhance the functionality and performance of embedded systems.
C113.4	Apply networking principles to integrate and enable communication between embedded devices in a networked environment.
C113.5	Design suitable embedded systems for real-world applications, considering factors such as performance, power, and scalability.

Course Code / Course Name: VL4006 / Advanced wireless sensor networks

CO No.	Course Outcomes (COs)
C114.1	Design simple wireless network concepts, understanding the fundamentals of wireless communication.
C114.2	Analyze different network architectures to optimize performance and scalability in wireless systems.
C114.3	Implement MAC layer and routing protocols to ensure efficient communication and data transfer in wireless networks.
C114.4	Solve timing and control issues in wireless sensor networks to improve synchronization and energy efficiency.
C114.5	Analyze secured wireless sensor networks to ensure data privacy, integrity, and reliable communication.

Course Code / Course Name: VL4211 / Verification using UVM laboratory

CO No.	Course Outcomes (COs)
C115.1	Understand the features and capabilities of the UVM class library in SystemVerilog for effective verification.
C115.2	Integrate multiple UVCs into a complete verification environment to ensure comprehensive test coverage.
C115.3	Create reusable, scalable, and robust UVM verification components (UVCs) to enhance testbench modularity and efficiency.
C115.4	Develop a UVM testbench structure using the UVM library base classes and the UVM factory to ensure structured and maintainable test environments.
C115.5	Design a register model for the DUT and utilize the model for initialization and accessing DUT registers to streamline testing and validation.

Course Code / Course Name: VL4212 / Term Paper Writing and Seminar

CO No.	Course Outcomes (COs)
C116.1	Understand various research methodologies to enhance the ability to conduct academic research effectively.
C116.2	Refine academic writing skills, focusing on thesis development, organization, clarity, and coherence for producing scholarly term papers.
C116.3	Learn effective techniques for delivering engaging and informative presentations to communicate research findings clearly.
C116.4	Understand the principles of academic integrity, including proper citation practices and the avoidance of plagiarism in academic work.
C116.5	Demonstrate mastery of course concepts and skills by completing a substantial term paper that showcases academic writing proficiency.

SEMESTER III

Course Code / Course Name: VL4351 / VLSI Signal Processing

CO No.	Course Outcomes (COs)
C201.1	Determine the parameters influencing the efficiency of DSP architectures and apply pipelining and parallel processing techniques to optimize FIR structures.
C201.2	Analyze and modify design equations to create efficient DSP architectures for transforms while applying low-power techniques to reduce power dissipation.
C201.3	Enhance the speed of the convolution process and develop fast, area-efficient IIR structures for improved performance.
C201.4	Design fast and area-efficient multiplier architectures to improve computational efficiency in DSP systems.
C201.5	Minimize multiplications and develop fast hardware for synchronous digital systems to achieve optimal performance and resource utilization.

Course Code / Course Name: VL4092 / Soft Computing and Optimization Techniques

CO No.	Course Outcomes (COs)
C202.1	Develop applications using various soft computing techniques like Fuzzy, Genetic Algorithms (GA), and Neural Networks to solve complex problems.
C202.2	Implement a Neuro-Fuzzy and Neuro-Fuzz-GA expert system to combine the strengths of neural networks, fuzzy logic, and genetic algorithms.
C202.3	Apply machine learning techniques through Neural Networks to model and solve real-world problems effectively.
C202.4	Model a Neuro-Fuzzy system for clustering and classification tasks, leveraging its capability to handle uncertainty in data.
C202.5	Utilize optimization techniques to solve real-world problems, enhancing efficiency and accuracy in various applications.

Course Code / Course Name: CP4252 / Machine Learning

CO No.	Course Outcomes (COs)
C203.1	Understand and outline problems for each type of machine learning.
C203.2	Design a Decision tree and Random forest for an application.
C203.3	Implement Probabilistic Discriminative and Generative algorithms for an application and analyze the results.
C203.4	Use a tool to implement typical Clustering algorithms for different types of applications
C203.5	Design HMM for a Sequence Model type of application and identify applications suitable for different types of Machine Learning with suitable justification.

Course Code / Course Name: ET4251 / IoT for smart systems

CO No.	Course Outcomes (COs)
C204.1	Analyze the concepts of IoT and its current developments to understand its impact and potential.
C204.2	Compare and contrast different platforms and infrastructures available for IoT, evaluating their strengths and weaknesses.
C204.3	Explain different protocols and communication technologies used in IoT for effective data exchange and system integration.
C204.4	Analyze big data analytics and programming techniques in IoT to extract meaningful insights and enhance system functionality.
C204.5	Implement IoT solutions for smart applications, applying IoT principles to real-world use cases for improved efficiency and automation.

Course Code / Course Name: VL4311/ Project Work I

CO No.	Course Outcomes (COs)
C205.1	Demonstrate sound technical knowledge of the selected project topic, showcasing expertise in the area of study.
C205.2	Identify problems, formulate solutions, and effectively address complex challenges in engineering projects.
C205.3	Design engineering solutions to complex problems by utilizing a systems approach to ensure holistic and efficient outcomes.
C205.4	Conduct an engineering project, applying project management and technical skills to complete tasks successfully.
C205.5	Communicate engineering ideas and solutions effectively through presentations, addressing the needs of different audiences.

SEMESTER IV**Course Code / Course Name:** VL4411 / Project Work II

CO No.	Course Outcomes (COs)
C206.1	Demonstrate a sound technical knowledge of the selected project topic, showcasing expertise and understanding in the field.
C206.2	Undertake problem identification, formulation, and solution to address complex challenges effectively.
C206.3	Design engineering solutions to complex problems by applying a systems approach to ensure comprehensive and efficient outcomes.
C206.4	Conduct an engineering project, integrating project management and technical skills to complete tasks successfully.
C206.5	Communicate engineering ideas and solutions effectively through presentations, following professional standards in engineering practice.