ROEVER ENGINEERING COLLEGE
(Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai)
(Inclusion under Sections 2(F) and 12(B) of the UGC Act, 1956)
Elambalur, Perambalur – 621 220.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Course Outcome

Regulation 2021

Semester - I		
Course Code & Course Name	**Course outcome**	
HS3152 Professional English-I	CO1	Develop communication and conversation of general information
	CO2	Construct narratives for personal experiences, events, short reports, etc., efficiently.
	CO3	Explain clear definitions, descriptions and essays on various topics effectively.
	CO4	Summarize mini-presentation and non-verbal communication.
	CO5	Explain their opinion effectively through group discussions, debates, role play etc.,
MA3151 Matrices and Calculus	CO1	Apply the matrix algebra methods for solving practical problems
	CO2	Using the differential calculus tools in solving various application problems
	CO3	Discuss to use differential calculus ideas on several variable functions
	CO4	Apply different methods of integration in solving practical problems
	CO5	Execute multiple integral ideas in solving areas, volumes and other practical problems
PH3151 Engineering Physics	CO1	Describe the concept of mechanics.
	CO2	Estimate the knowledge of electromagnetic waves and its applications.
	CO3	Explain the basics of oscillations, optics and lasers.
	CO4	Summarize the importance of quantum physics.
	CO5	Visualize knowledge towards the applications of quantum mechanics.
CY3151 Engineering Chemistry	CO1	Solve the problems of using hard water in boiler and methods of water treatment.
	CO2	Examine the knowledge about the nanomaterial and their applications to society.

	CO3	Analyze the making of composite material with help of the basic concepts of phase rule.
	CO4	Differentiate the significance of solids, liquids and gaseous fuels and calculate the calorific values of fuels and the requirements of air for complete combustion in fuels.
	CO5	Categorize the storage devices and operating principles, working processes and applications of energy conversion.
GE3151 Problem Solving and Python Programming	CO1	Develop algorithmic solutions to simple computational problems.
	CO2	Develop and execute simple Python programs.
	CO3	Write simple Python programs using conditionals and loops for solving problems.
	CO4	Decompose a Python program into functions.
	CO5	Represent compound data using Python lists, tuples, dictionaries etc and Read and write data from/to files in Python programs.
GE3171 Problem Solving and Python Programming Laboratory	CO1	Develop algorithmic solutions to simple computational problems
	CO2	Develop and execute simple Python programs.
	CO3	Implement programs in Python using conditionals and loops for solving problems..
	CO4	Deploy functions to decompose a Python program.
	CO5	Process compound data using Python data structures.
BS3171 Physics and Chemistry Laboratory	CO1	Determine the rigidity modulus of wire and moment of inertia of disc, young's modulus of beam by uniform & non uniform bending method
	CO2	Understand the Harmonic oscillations of cantilever. Determine of thickness of a thin sheet, Velocity & Compressibility by ultrasonic interferometer were determined
	CO3	Analyze the wavelength of laser using Grating, determines band gap of semiconductor using Post office box were determined.
	CO4	Enhance skills in water quality parameters alkalinity hardness, DO, chloride and copper
	CO5	Examine the electroanalytical techniques such as, potentiometer and conductometry impurities in aqueous solutions were determined.
Course Code & Course Name	**Course outcome**	
GE3172 English Laboratory	CO1	Utilize introducing skills and telephonic conversation skills effectively.
	CO2	Develop the narration and summation skills.
	CO3	Make use of product description in workplaces.
	CO4	Build classification and recommendations in planning.
	CO5	Analyze different viewpoints in panel discussions.
Semester - II		
HS3252 Professional English - II	CO1	Apply the practical knowledge of making comparisons between listening, speaking, reading and writing
	CO2	Understand the importance of expressing relations in speaking and writing.
	CO3	Find out all the possible arrangements in problem solving essays.
	CO4	Develop writing in any given context such as reporting events and

		research.
	CO5	Build knowledge by presenting ideas and information clearly.
MA3251Statistics and Numerical Methods	CO1	Understand the concept of testing of hypothesis for small and large samples in real life problems
	CO2	Execute Apply basic concepts of classifications of design of experiments in the field of agriculture.
	CO3	Solve the numerical techniques of interpolation in various intervals and apply the n numerical techniques of differentiation and integration for engineering problems.
	CO4	Understand the knowledge of various techniques and methods for solving first and secondorder ordinary differential equations.
	CO5	Solve partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.
PH3254Physics for Electronics Engineering	CO1	Distinguish the basics of crystallography and its importance for varied materials properties.
	CO2	Extend the knowledge on the electrical and magnetic properties of materials and their applications
	CO3	Realise the properties of semiconductor physics and functioning of semiconductor devices
	CO4	Elaborate the optical properties of materials and working principles of various optical devices
	CO5	Gain the importance of nanotechnology and Nano devices
BE3254 Electrical and Instrumentation Engineering	CO1	Examine the relevant methods for electrical circuits using ohm's law, Kirchhoff's laws, mesh current and Node Voltage methods and topologies.
	CO2	Use appropriate procedures, tools and techniques for ac and dc circuit using network theorems.
	CO3	Design and develop the series and parallel resonance circuits and coupling in circuits.
	CO4	Synthesize information and knowledge about the problem in first and second order AC and DC Circuits for Steady – State and transient response in the time domain.
	CO5	Represent data to facilitate analysis for two port networks.
GE3251 Engineering Graphics	CO1	Create the geometrical constructions of conics, cycloids and Involutes
	CO2	Construct the projections of points, lines and plane surfaces
	CO3	Construct the projections of simple regular polyhedral, truncated solids and section of solids and develop the orthographic projection and isometric views of objects
	CO4	Construct the development of lateral surfaces of simple solids.
	CO5	Construct the isometric and perspective projection of simple solids
EC3251 Circuit Analysis	CO1	Apply the basic concept of circuit analysis such as Kirchhoff's laws, mesh current & node voltage method for analysis of DC & AC circuits.
	CO2	Apply suitable network theorems and analyze AC and DC circuits.

	CO3	Analyze steady state response of any R,L and C circuits.
	CO4	Analyze the transient response for any RC,RL circuits and frequency.
	CO5	Analyze the transient response for any RLC circuits and frequency.
. GE3271 Engineering Practices Laboratory	CO1	Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work.
	CO1	Wire various electrical joints in common household electrical wire work.
	CO3	:Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipments
	CO4	Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.
	CO5	Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work.

Course Code & Course Name	Course outcome	
GE3272Communication Laboratory / Foreign Language	CO1	Interpret about experiences and events in life.
	CO2	Elaborate news stories and plans and decisions from various perspectives.
	CO3	Build effective emails and letters.
	CO4	Summarize critical reports, instructions and short articles.
	CO5	Organize appropriate recommendations and to write effective job applications.
Semester - III		
MA3355Random Processes and Linear Algebra	CO1	Apply the concept of random processes in engineering disciplines.
	CO2	Understand the fundamental concepts of probability with a thorough knowledge of standard distributions that can describe certain real-life
	CO3	Understand the basic concepts of one and two dimensional random variables and apply them to model engineering problems.
	CO4	Explain the fundamental concepts of advanced algebra and their role in modern mathematics and applied contexts.
	CO5	Demonstrate accurate and efficient use of advanced algebraic techniques

Course Code & Course Name	Course outcome	
EC3353Electronic Devices and Circuits	CO1	Outline the structure and explain the operation of various semiconductor devices.
	CO2	Elaborate different biasing methods of BJT and MOSFET.
	CO3	Obtain and analyze the frequency response of multistage amplifiers.
	CO4	Design and Analyze the operation of Feedback amplifiers
	CO5	Classify various power amplifiers and compare their parameters.

EC3351 Control Systems	CO1	Compute the transfer function of different physical systems.
	CO2	Analyse the time domain specification and calculate the steady state error.
	CO3	Illustrate the frequency response characteristics of open loop and closed loop system response.
	CO4	Analyse the stability using Routh and root locus techniques.
	CO5	Illustrate the state space model of a physical system and discuss the concepts of sampled data control system.
Course Code & Course Name	**Course outcome**	
EC3352 Digital Systems Design	CO1	Simplification of digital logic using Boolean algebra & Karnaugh map.
	CO2	Design various combinational digital circuits using logic gates.
	CO3	Analyze and design synchronous sequential circuits.
	CO4	Analyze and design asynchronous sequential circuits.
	CO5	Build logic gates and use programmable devices.
Semester - IV		
EC3361Electronic Devices and Circuits Laboratory	CO1	Characteristics of PN Junction Diode and Zener diode.
	CO2	Design and Testing of BJT
	CO3	Operation of Differential amplifiers
	CO4	Design and Testing of MOSFET amplifiers.
	CO5	Operation of power amplifiers
Course Code & Course Name	**Course outcome**	
CS3362C Programming and Data Structures Laboratory	CO1	Use different constructs of C and develop applications
	CO2	Write functions to implement linear and non-linear data structure operations
	CO3	Suggest and use the appropriate linear / non-linear data structure operations for a given problem
	CO4	Apply appropriate hash functions that result in a collision free scenario for data storage and Retrieval
	CO5	Implement Sorting and searching algorithms for a given application
GE3361Professional Development	CO1	Use MS Word to create quality documents, by structuring and organizing content for their day to day technical and academic requirements
	CO2	Use MS EXCEL to perform data operations and analytics, record, retrieve data as per requirements and visualize data for ease of understanding
	CO3	Use MS PowerPoint to create high quality academic presentations by including common tables, charts, graphs, interlinking other elements, and using media objects.
Course Code & Course Name	**Course outcome**	

EC3452 ELECTRO MAGNETIC FIELDS	CO1	Relate the fundamentals of vector, coordinate system to electromagnetic concepts
	CO2	Analyze the characteristics of Electrostatic field
	CO3	Interpret the concepts of Electric field in material space and solve the boundary conditions
	CO4	Explain the concepts and characteristics of Magneto Static field in material space and solve boundary conditions.
	CO5	Determine the significance of time varying fields
EC3401 Networks and Security	CO1	Explain the Network Models, layers and functions.
	CO2	Categorize and classify the routing protocols.
	CO3	List the functions of the transport and application layer.
	CO4	Evaluate and choose the network security mechanisms.
	CO5	Discuss the hardware security attacks and countermeasures.
Course Code & Course Name	**Course outcome**	
EC3451 LINEAR INTEGRATED CIRCUITS	CO1	Design linear and nonlinear applications of OP – AMPS
	CO2	Design applications using analog multiplier and PLL
	CO3	Design ADC and DAC using OP – AMPS 80
	CO4	Generate wave forms using OP – AMP Circuits
	CO5	Analyze special function ICs
EC3492 DIGITAL SIGNAL PROCESSING	CO1	Apply DFT for the analysis of digital signals and systems
	CO2	Design IIR and FIR filters
	CO3	Characterize the effects of finite precision representation on digital filters
	CO4	Design multirate filters
	CO5	Apply adaptive filters appropriately in communication systems
Course Code & Course Name	**course outcome**	
EC3491 Communication Systems	CO1	Gain knowledge in amplitude modulation techniques
	CO2	Understand the concepts of Random Process to the design of communication systems
	CO3	Gain knowledge in digital techniques
	CO4	Gain knowledge in sampling and quantization
	CO5	Understand the importance of demodulation techniques
GE3451 ENVIRONMENTAL SCIENCES AND SUSTAINABILITY	CO1	To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation.
	CO2	To identify the causes, effects of environmental pollution and natural disasters and contribute to the preventive measures in the society.
	CO3	To identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.
	CO4	To recognize the different goals of sustainable development and apply them for suitable technological advancement and societal

		development.
	CO5	To demonstrate the knowledge of sustainability practices and identify green materials, energy cycles and the role of sustainable urbanization.
Course Code & Course Name	**Course outcome**	
EC3461 COMMUNICATION SYSTEMS LABORATORY	CO1	Design AM, FM & Digital Modulators for specific applications.
	CO2	Compute the sampling frequency for digital modulation.
	CO3	Simulate & validate the various functional modules of Communication system.
	CO4	Demonstrate their knowledge in base band signaling schemes through implementation of digital modulation schemes.
	CO5	Apply various channel coding schemes & demonstrate their capabilities towards the improvement of the noise performance of Communication system.
EC3462 LINEAR INTEGRATED CIRCUITS LABORATORY	CO1	Analyze various types of feedback amplifiers
	CO2	Design oscillators, tuned amplifiers, wave-shaping circuits and multivibrators
	CO3	Design and simulate feedback amplifiers,oscillators, tuned amplifiers, wave- shaping circuits and multivibrators, filters using SPICE Tool.
	CO4	Design amplifiers, oscillators, D-A converters using operational amplifiers.
	CO5	Design filters using op-amp and perform an experiment on frequency response
Semester -V		
Course Code & Course Name	**Course outcome**	
EC3501 Wireless Communication	CO1	Understand The Concept And Design Of A Cellular System.
	CO2	Understand Mobile Radio Propagation And Various Digital Modulation Techniques.
	CO3	Understand The Concepts Of Multiple Access Techniques And Wireless Networks
	CO4	Characterize a wireless channel and evolve the system design specifications
	CO5	Design a cellular system based on resource availability and traffic demands.
EC3552 VLSI and Chip Design	CO1	In depth knowledge of MOS technology
	CO2	Understand Combinational Logic Circuits and Design Principles
	CO3	Understand Sequential Logic Circuits and Clocking Strategies
	CO4	Understand Memory architecture and building blocks
	CO5	Understand the ASIC Design Process and Testing.
Course Code & Course Name	**Course outcome**	
EC3551 Transmission lines and RF Systems	CO1	Explain the characteristics of transmission lines and its losses.
	CO2	Calculate the standing wave ratio and input impedance in high frequency transmission lines.
	CO3	Analyze impedance matching by stubs using Smith Charts.

	CO4	Comprehend the characteristics of TE and TM waves.
	CO5	Design a RF transceiver system for wireless communication
CEC345 Optical Communication & Networks	CO1	Realize Basic Elements In Optical Fibers, Different Modes And Configurations.
	CO2	Analyze The Transmission Characteristics Associated With Dispersion And Polarization Techniques.
	CO3	Design Optical Sources And Detectors With Their Use In Optical Communication System.
	CO4	Construct Fiber Optic Receiver Systems, Measurements And Techniques.
	CO5	Design Optical Communication Systems And Its Networks.

Course Code & Course Name	**Course outcome**	
CEC366 Image Procesing	CO1	Know and understand the basics and fundamentals of digital image processing, such as digitization, sampling, quantization, and 2D-transforms.
	CO2	Operate on images using the techniques of smoothing, sharpening and enhancement.
	CO3	Understand the restoration concepts and filtering techniques.
	CO4	Learn the basics of segmentation, features extraction, compression and recognition methods for color models.
	CO5	Comprehend image compression concepts.
CEC365 Wireless Sensor Network Design	CO1	To be able to design solutions for WSNs applications
	CO2	To be able to develop efficient MAC and Routing Protocols
	CO3	To be able to design solutions for 6LOWPAN applications
	CO4	To be able to develop efficient layered protocols in 6LOWPAN
	CO5	To be able to use Tiny OS and Contiki OS in WSNs and 6LOWPAN applications

Course Code & Course Name	**Course outcome**	
MX3084 Disaster Risk Reduction and Management	CO1	To impart knowledge on the concepts of Disaster, Vulnerability and Disaster Risk reduction (DRR)
	CO2	To enhance understanding on Hazards, Vulnerability and Disaster Risk Assessment prevention and risk reduction
	CO3	To develop disaster response skills by adopting relevant tools and technology
	CO4	Enhance awareness of institutional processes for Disaster response in the country
	CO5	Develop rudimentary ability to respond to their surroundings with potential Disaster response in areas where they live, with due sensitivity
EC3561 VLSI LABORATORY	CO1	Write HDL code for basic as well as advanced digital integrated circuit
	CO2	Import the logic modules into FPGA Boards
	CO3	Synthesize Place and Route the digital Ips
	CO4	Design, Simulate and Extract the layouts of Digital & Analog IC

		Blocks using EDA tools
	CO5	Test and Verification of IC design
Semester - VI		
Course Code & Course Name	**Course outcome**	
ET3491 EMBEDDED SYSTEMS AND IOT DESIGN	CO1	Describe fundamental engineering concepts to the 8051 Microcontroller.
	CO2	Apply engineering mathematics to the embedded systems processor
	CO3	Examine the relevant methods to the processes and operating systems in embedded systems.
	CO4	Analyze scientific principles to the IOT architecture and protocols.
	CO5	Demonstrate an experimental approach to Raspberry Pi.
CS3491 ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING	CO1	Use appropriate search algorithms for problem solving
	CO2	Apply reasoning under uncertainty
	CO3	Build supervised learning models
	CO4	Build ensembling and unsupervised models
	CO5	Build deep learning neural network models

Course Code & Course Name	**Course outcome**	
CEC337 DSP ARCHITECTURE AND PROGRAMMING	CO1	Describe the architectural features of DSP Processors.
	CO2	Interpret the organization of TMS320C54xx DSP processors.
	CO3	Compare the organization of TMS320C64xx DSP processors.
	CO4	Pointout the Algorithmic solutions using DSP Processors.
	CO5	Develop Programmable DSP Processors to build real-time DSP systems.
CBM341 BODY AREA NETWORKS	CO1	Identify the technical challenges for implementing body area networks.
	CO2	Build a body area networks with all components for appropriate application in medicine.
	CO3	Analyse the information through appropriate communication method to improve the security parameters.
	CO4	Explain the need for medical device regulation followed in the various regions.
	CO5	Identify the concepts of BAN for various medical applications
CEC352 SATELLITE COMMUNICATION	CO1	Identify the satellite orbits
	CO2	Analyze the satellite subsystems
	CO3	Evaluate the satellite link power budget
	CO4	Identify access technology for satellite
	CO5	Design various satellite applications

Semester -VII		
GE3791 & Human Values and Ethics	CO1	Identify the importance of democratic, secular and scientific values in harmonious functioning of social life.
	CO2	Practice democratic and scientific values in both their personal and professional life.
	CO3	Find rational solutions to social problems.
	CO4	Behave in an ethical manner in society.
	CO5	Practice critical thinking and the pursuit of truth.
Course Code & Course Name	**Course outcome**	
GE3751 & Principles of Management	CO1	Upon completion of the course, students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling
	CO2	Have same basic knowledge on international aspect of management
	CO3	Ability to understand management concept of organizing
	CO4	Ability to understand management concept of directing
	CO5	Ability to understand management concept of controlling
CCS361 ROBOTIC PROCESS AUTOMATION	CO1	Ability to understand the basic concepts of Robotic Process Automation.
	CO2	Ability to expose to the key RPA design and development strategies and methodologies
	CO3	Ability to learn the fundamental RPA logic and structure.
	CO4	Ability to explore the Exception Handling, Debugging and Logging operations in RPA.
	CO5	Ability to learn to deploy and Maintain the software bot.
Course Code & Course Name	**Course outcome**	
OMR351 MECHATRONICS	CO1	Select sensors to develop mechatronics systems.
	CO2	Explain the architecture and timing diagram of microprocessor, and also interpret and develop programs
	CO3	Design appropriate interfacing circuits to connect I/O devices with microprocessor.
	CO4	Apply PLC as a controller in mechatronics system
	CO5	Design and develop the apt mechatronics system for an application.
OMR353 SENSORS	CO1	Understand various sensor effects, sensor characteristics, signal types, calibration methods and obtain transfer function and empirical relation of sensors.
	CO2	Analyze and select suitable sensor for displacement, proximity and range measurement.
	CO3	Analyze and select suitable sensor for force, magnetic field, speed, position and direction measurement.
	CO4	Analyze and Select suitable sensor for light detection, pressure and temperature measurement and also familiar with other miniaturized smart sensors.

	CO5	Select and design suitable signal conditioning circuit with proper compensation and linearizing element based on sensor output signal.
CS3711 Summer internship	CO1	Learn the industry practices, processes, techniques, technology, automation and other core aspects of software industry
	CO2	Analyze, Design solutions to complex business problems
	CO3	Learn the preparation of technical reports and presentation.
	CO4	Develop technical, soft, team skills to cater to the needs of the industry.
	CO5	Get the practical knowledge on product development skill to solve related problem
Semester – VIII		
Course Code & Course Name	**Course outcome**	
EC3811 Project Work / Internship	CO1	**Identify** a real-world problem in the engineering fields
	CO2	**Analyze** the identified problem by surveying the relevant literature.
	CO3	Design and develop new product and solution.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

M.E VLSI DESIGN- COURSE OUTCOME

REGULATION 2021

Semester - I		
Course Code & Course Name	**Course outcome**	
VL4153 Graph Theory and Optimization Techniques	CO1	Apply graph ideas is solving connectivity related problems.
	CO2	Apply fundamental graph algorithms to solve certain optimization problems
	CO3	Formulate and construct mathematical models for linear programming problems and solve the transportation and assignment problems.
	CO4	Model various real life situations as optimization problems and effect their solution through Non-linear programming
	CO5	Apply simulation modeling techniques to problems drawn from industry management and other engineering fields
RM4151 Research Methodology and IPR	CO1	Ability to arrange the conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose
	CO2	Ability to gather information in a measured and systematic manner to ensure accuracy and facilitate data analysis
	CO3	Ability to transform and model the collected data to discover useful information for decisionmaking
	CO4	Ability to awareness about the benefits of Intellectual property
	CO5	Ability to take up legal certainty while applying for Patent
VL4151 Analog IC Design	CO1	Design amplifiers to meet user specifications
	CO2	Analyse the frequency and noise performance of amplifiers
	CO3	Design and analyse feedback amplifiers and one stage op amps
	CO4	Design and analyse two stage op amps
	CO5	Design and analyse current mirrors and current sinks with mos devices
VL4152 Digital CMOS VLSI Design	CO1	Use mathematical methods and circuit analysis models in analysis of CMOS digital circuits
	CO2	Create models of moderately sized static CMOS combinational circuits that realize specified digital functions and to optimize combinational circuit delay using RC delay models and logical effort

	CO3	Design sequential logic at the transistor level and compare the tradeoffs of sequencing elements including flip-flops, transparent latches
	CO4	Understand design methodology of arithmetic building blocks
	CO5	Design functional units including ROM and SRAM
AP4152 Advanced Digital System Design	CO1	Analyse and design synchronous sequential circuits.
	CO2	Analyse hazards and design asynchronous sequential circuits.
	CO3	Knowledge on the testing procedure for combinational circuit and PLA.
	CO4	Able to design PLD and ROM.
	CO5	Design and use programming tools for implementing digital circuits of industry standards.
AP4153 Semiconductor Devices and Modeling	CO1	Explore the properties of MOS capacitors
	CO2	Analyze the various characteristics of MOSFET devices
	CO3	Describe the various CMOS design parameters and their impact on performance of the device.
	CO4	Discuss the device level characteristics of BJT transistors
	CO5	Identify the suitable mathematical technique for simulation
VL4111 FPGA Laboratory	CO1	Understand and use the System Verilog RTL design and synthesis features, including new data types, literals, procedural blocks, statements, and operators, relaxation of Verilog language rules, fixes for synthesis issues, enhancements to tasks and functions, new hierarchy and connectivity features, and interfaces.
	CO2	Appreciate and apply the System Verilog verification features, including classes, constrained random stimulus, coverage, strings, queues and dynamic arrays, and learn how to utilize these features for more effective and efficient verification
	CO3	The implementation of higher level of abstraction to design and verification
	CO4	Develop Verilog test environments of significant capability and complexity.
	CO5	Integrate scoreboards, multichannel sequencers and Register Models
VL4112 Analog IC Design Laboratory	CO1	Design digital Circuit using CMOS given a design specification.
	CO2	Design analog Circuit using CMOS given a design specification.
	CO3	Design and carry out time domain and frequency domain simulations of simple analog building blocks
	CO4	Study the pole zero behaviors and compute the input/output impedances
	CO5	Use EDA tools for Circuit Design
Semester – II		
VL4251 Design for Verification using UVM	CO1	Understand the basic concepts of two methodologies UVM
	CO2	Build actual verification components
	CO3	Generate the register layer classes.

	CO4	Code testbenches using UVM.
	CO5	Understand advanced peripheral bus testbenches.
VL4291 Low Power VLSI Design	CO1	Find the power dissipation of MOS circuits
	CO2	Design and analyze various MOS logic circuits
	CO3	Apply low power techniques for low power dissipation
	CO4	Estimate the power dissipation of ICs
	CO5	Develop algorithms to reduce power dissipation by software tools.
VL4292 RFIC Design	CO1	Understand the principles of operation of an RF receiver front end
	CO2	Design and apply constraints for LNAs, Mixers and frequency synthesizers
	CO3	Analyze and design mixers
	CO4	Design different types of oscillators and perform noise analysis
	CO5	Design PLL and frequency synthesizer
VL4252 VLSI Testing	CO1	Understand VLSI Testing Process
	CO2	Develop Logic Simulation and Fault Simulation
	CO3	Develop Test for Combinational and Sequential Circuits
	CO4	Understand the Design for Testability
	CO5	Perform Fault Diagnosis
VL4071 ASIC Design	CO1	Apply Logical Effort Technique for predicting Delay, Delay Minimization and FPGA Architectures
	CO2	Design Logic Cells and I/O Cells
	CO3	Analyze the various resources of recent FPGAs
	CO4	Use Algorithms for Floor Planning and Placement of Cells and to Apply Routing Algorithms for Optimization of Length and Speed
	CO5	Analyze High Performance Algorithms Available for ASICs
II4092 System On Chip	CO1	Explain all important components of a System-on-Chip and an embedded system,
	CO2	Digital hardware and embedded software
	CO3	Outline the major design flows for digital hardware and embedded software
	CO4	Discuss the major architectures and trade-offs concerning performance, cost and power
	CO5	Consumption of single chip and embedded systems
VL4211 Verification using UVM Laboratory	CO1	Understand the features and capabilities of the UVM class library for system Verilog
	CO2	Combine multiple UVCs into a complete verification environment
	CO3	Create and configure reusable, scalable, and robust UVM verification components (UVCs)
	CO4	Create a UVM testbench structure using the UVM library base classes and the UVM factory
	CO5	Develop a register model for your DUT and use the model for initialization and accessing DUT registers

Semester – III		
VL4351 VLSI Signal Processing	CO1	Determine the parameters influencing the efficiency of DSP architectures and apply pipelining and parallel processing techniques to alter FIR structures for efficiency
	CO2	Analyse and modify the design equations leading to efficient DSP architectures for transforms apply low power techniques for low power dissipation
	CO3	Speed up convolution process and develop fast and area efficient IIR structures
	CO4	Develop fast and area efficient multiplier architectures
	CO5	Reduce multiplications and build fast hardware for synchronous digital systems
VL4091 Network on Chip	CO1	Compare different architecture design
	CO2	Discuss different routing algorithms
	CO3	Explain three dimensional Networks on Chip architectures
	CO4	Test and design fault tolerant NOC
	CO5	Design three dimensional architectures of NOC
VL4009 VLSI Architectures for Image Processing	CO1	Analyze Various Architectures to Realize Image Processing Algorithms and Explain The 3D Image Processing Algorithms
	CO2	Explore Various Processing Techniques of Image and Design Different Architectures for Image Processing
	CO3	Analyze various pipelined hardware architecture for 2D and 3D Image processing
	CO4	Realize binary image processing algorithm in VLSI systems
	CO5	Implement filter techniques in 2D and 3D image.