



# 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 2017

Semester - I		
Course Code & Course Name	Course outcome	
HS8151 Communicative English	CO1	Use the development in sharing information about family and friends
	CO2	Distinguish general comprehending skills and present lucid skills in free writing
	CO3	Analyze the basic grammar techniques and utilize it in enhancing language
	CO4	Discover an environment for reading and develop good language skills
	CO5	Prepare flair for any kind of writing with rich vocabulary and proper syntax
MA8151 Engineering Mathematics - I	CO1	Understand the limit, continuity and derivative of the functions. Solve various functions and its maxima /minima using differentiation rules.
	CO2	Apply the total and partial derivatives in Taylor series expansion of functions and the extremum of functions.
	CO3	Evaluate the integrals both by using Riemann sums and by using the fundamental theorem of Calculus. Evaluate integrals using various techniques of integration.
	CO4	Understand the concepts of double, triple integration and determine the area and volume using integration. Also understand Change of order of integration and Change of variables in integrals.
	CO5	Solve the linear equations of second and higher order with constant, simultaneous first order differential equations. Apply the method of variation of parameters and undetermined coefficients in solving the differential equation.
PH8151 Engineering Physics	CO1	Understand the basics in properties of matter and its applications
	CO2	Acquire knowledge on the concepts of waves and optical devices and their applications in fiber optics
	CO3	Understand the concepts of thermal properties of materials and their applications in expansion joints and heat exchangers
	CO4	Understands & Apply Quantum concepts in tunneling microscope.
	CO5	Understand the basics of Crystal structures and different crystal growth techniques

CY8151 Engineering Chemistry	CO1	Identified the sources available for the treatment of Water
	CO2	Explain the Surface chemistry to Facilitate better understanding on Adsorption of Gases and Catalysis.
	CO3	Apply the Phase rule and better understanding on Making Alloys.
	CO4	Interpret the types of fuels and better understanding on combustion process.
	CO5	List out the Energy resources and Explain the construction, working principles and uses of Batteries
GE8151 Problem Solving and Python Programming	CO1	Develop algorithmic solutions to simple computational problems.
	CO2	Write simple Python programming constructs.
	CO3	Implement programs in Python using conditionals and loops for solving problems
	CO4	Explain compound data types using Python data structures
	CO5	Utilize Python packages in developing software applications.
GE8152 Engineering Graphics	CO1	Create the geometrical constructions of conics, cycloids and Involutés
	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
GE8161 Problem Solving and Python Programming Laboratory	CO1	Demonstrate simple Python programs.
	CO2	Construct Python programs with conditionals and loops.
	CO3	Develop Functions for structuring Python programs.
	CO4	Distinguish compound data using Python lists, tuples and dictionaries.
	CO5	Build the programs using files in Python.
HS8251 Physics and Chemistry Laboratory	CO1	Calculate the young's modulus and Rigidity modulus by applying principles of elasticity. Find the thermal conductivity of bad conductor.
	CO2	Understand laser concepts and applies it to find the particle size. Determine the thickness of the thin material using interference concept.
	CO3	Determine the velocity of sound waves in liquid and estimates the band gap of Semiconductor
	CO4	Determine of water quality parameters through volumetric and instrumental analysis
	CO5	Determine the Strength of Acids through volumetric and instrumental analysis

## Semester - II

Course Code & Course Name	Course outcome	
HS8251 Technical English	CO1	Relate the ideas into its elementary constituents, analyze and act after a meaningful thought process
	CO2	Apply the phrase and passage and explicitly pass on the ideas meaningfully
	CO3	Prepare to interpret the given phrase or the graphical rendering and review the contents well individually or as a group
	CO4	Demonstrate on the communication aspects of complicated ideas and respond positively
	CO5	Illustrate the issues and find the rudiments of the problem individually and as a group
MA8251 Engineering Mathematics - II	CO1	Eigen values and eigenvectors, diagonalization of a matrix, Symmetric matrices, Positive definite matrices and similar matrices.
	CO2	Gradient, divergence and curl of a vector point function and related identities.
	CO3	Evaluation of line, surface and volume integrals using Gauss, Stokes and Green's theorems and their verification
	CO4	Analytic functions, conformal mapping and complex integration.
	CO5	Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.
PH8253 Physics for Electronics Engineering	CO1	Apply basic knowledge on classical and quantum electron theories, and energy band structures
	CO2	Summarize the fundamental knowledge on basics of semiconductor physics and its applications in various devices in electronics.
	CO3	Analyses the basic definition of Magnetic and dielectric materials, their application in Communication fields.
	CO4	Articulate the Scientific principles and Engineering concepts in Optical materials and analyzing their applications in Photo devices and Society.
	CO5	Predict the basics of Nanomaterials and functioning of spintronics and carbon Nanotubes.
BE8254 Basic Electrical and Instrumentation Engineering	CO1	Analyze the DC Electrical Circuits.
	CO2	Analyze the AC Electrical Circuits.
	CO3	Explain the working principle & Performance Characteristics of Electrical Machines.
	CO4	Explain the Construction & Static Characteristics of Electronic devices and its Application.
	CO5	Choose the Instrument for Electrical measurement for a specific application.
EC8251 Circuit Analysis	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.
EC8252 ELECTRONIC DEVICES	CO1	Illustrate basic semiconductor devices, their characteristics and applications.
	CO2	Analyze the small signal amplifier with Bipolar junction Transistor.
	CO3	Inference the behavior of Field effect transistor
	CO4	Interpret special semiconductors devices.
	CO5	Understand Power control devices, LED, LCD and other opto-electronic devices
GE8261 Engineering Practices Laboratory	CO1	Understand plumbing and carpentry components of residential and industrial buildings
	CO2	Create models by welding, turning, sheet metal, smithy and foundry operations
	CO3	Explain operation of centrifugal Pump and air conditioner
	CO4	Make electrical wiring and measure electrical quantities
	CO5	Investigate AC signals and ripple factor.
EC8261 CIRCUITS AND DEVICES LABORATORY	CO1	Interpret the characteristics of basic electronic devices.
	CO1	Analyze the transient response of RL and RC circuits.
	CO3	Apply the Kirchoff's Current Law and Kirchoff's Voltage Law
	CO4	Develop Thevenin, Norton, Superposition, Maximum Power Transfer and Reciprocity Theorems.
	CO5	Identify the Resonant frequency of RLC circuits

Course Code & Course Name	Course outcome	
EC8351 ELECTRONICS CIRCUITS I	CO1	Outline the various methods of biasing transistors and compare its characteristics
	CO2	Summarize the Working principles, characteristics and applications of BJT small signal amplifier
	CO3	Illustrate the characteristics operation and applications of FET amplifier.
	CO4	Discover the frequency response and analyze the parameters of BJT and FET amplifier.
	CO5	Use the knowledge gained in troubleshoot and fault analysis of power supplies in electronic devices.
EC8352 SIGNALS AND SYSTEMS	CO1	Describe the fundamental engineering concepts to solve the various types of continuous and discrete time signals and systems.
	CO2	Apply the solution methods for solve the problem of Fourier series, Fourier and Laplace Transform of Continuous Time signal.
	CO3	Implement the engineering mathematics and computations to solve the response of CT LTI systems using Fourier and Laplace Transforms.
	CO4	Examine the solution methods to solve the problem to process of sampling and compute the Fourier Transform of Discrete time signals.
	CO5	Exercise the extract engineering requirements to solve the response of DT LTI systems using DTFT and Z transform.

### Semester - III

Course Code & Course Name	Course outcome	
LINEAR ALGEBRA & PARTIAL DIFFERENTIAL EQUATIONS	CO1	Understand the basic concepts and techniques of solving algebraic and transcendental equations.
	CO2	Solve numerical techniques of interpolation and error approximations in various intervals in real life situations.
	CO3	Apply the numerical techniques of differentiation and integration for engineering problems.
	CO4	Apply the knowledge of various techniques methods for solving first and second order ordinary differential equations with initial condition.
	CO5	Apply the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.
FUNDAMENTALS OF DATA STRUCTURES IN C	CO1	Develop appropriate methodologies for linear Data Structure and its operations using array and list
	CO2	Examine the concepts of advanced features of C
	CO3	Choose appropriate algorithm for Linear data structures like stack and Queue to implement applications
	CO4	Develop applications using Tree structure by defining a problem for the purpose of investigation, its scope and importance
	CO5	Interpret various sorting, searching and hashing techniques for a given problem

Course Code & Course Name	Course outcome	
EC8381 FUNDAMENTALS OF DATA STRUCTURES IN C LABORATORY	CO1	Examine and write basic and advanced programs in C
	CO2	Build functions and recursive functions in C.
	CO3	Apply linear data structures in problem solving using C language.
	CO4	Apply non-linear data structures in problem solving using C language.
	CO5	Build searching, sorting and hashing functions.
EC8361 ANALOG AND DIGITAL CIRCUITS LABORATORY	CO1	Determine the frequency response of CE/CC/CB/CS amplifiers.
	CO2	Analyze the characteristics of Darlington and differential amplifier.
	CO3	Analyze the bandwidth of single stage and multistage amplifiers.
	CO4	Design combinational circuits for arithmetic, code conversions and comparison operations.
	CO5	Build analog and digital circuits using simulation tool.
Course Code & Course Name	Course outcome	
HS8381 INTERPERSONAL SKILLS/LISTENING & SPEAKING	CO1	Utilize listening skills for recalling information
	CO2	Take part in conversations both in formal and informal
	CO3	Demonstrate general presentation
	CO4	Organize Group Discussion
	CO5	Make use of interpersonal strategies to negotiate compromise in group work
<b>Semester - IV</b>		
MA8451 PROBABILITY & RANDOM PROCESSES	CO1	Understand the fundamental knowledge of probability and standard distributions which can describe real life phenomenon.
	CO2	Apply the basic concepts of one and two dimensional random variables in engineering applications.
	CO3	Apply the concept of random processes in engineering disciplines
	CO4	Understand the concept of correlation and spectral densities and to solve related problems
	CO5	Analyze the response of random inputs to linear time invariant systems.
Course Code & Course Name	Course outcome	
EC8452 ELECTRONIC CIRCUITS II	CO1	Classify and analysis of different types of feedback amplifiers and understand its characteristics
	CO2	Analyze the working principles of High frequency, low frequency Oscillators and its Frequency of Oscillation.
	CO3	Analyze the performance characteristics of tuned amplifiers.
	CO4	Categorize the different wave shaping circuits and examine the Output response
	CO5	Identify different types of power amplifiers & DC convertors

EC8491 COMMUNICATION THEORY	CO1	Classify the concepts of generation and detection various AM Schemes
	CO2	Classify the concepts of modulation and demodulation of FM Waves.
	CO3	Apply the concepts of random process to design of communication systems.
	CO4	Analyze the noise performance of AM and FM systems.
	CO5	Analyze the knowledge in sampling and quantization
Course Code & Course Name	Course outcome	
EC8451 ELECTRO MAGNETIC FIELDS	CO1	Apply fundamental engineering concepts to Electric and Magnetic fields in free space and in materials
	CO2	Identify the mathematical engineering to the classify the electric fields through electrostatics laws.
	CO3	Examine the problem statements to the magnetic fields through electromagnetic laws.
	CO4	Discuss advanced mathematical techniques for Maxwell's equations in integral, differential and phasor forms in the time varying fields
	CO5	Classify scientific principles of wave propagation on basics of electromagnetic planes waves.
EC8453 LINEAR INTEGRATED CIRCUITS	CO1	Apply fundamental engineering concepts in current mirror circuits, operational amplifier stages and internal circuit diagram of IC 741.
	CO2	Design the linear and non-linear applications of operational amplifiers and special application IC.
	CO3	Identify the existing process and applications of analog multipliers and PLL for different modulation techniques
	CO4	Compare the behaviour and applications of different types of ADC and DAC.
	CO5	Generate a waveform using op-amp and IC 555 timer for engineering science.
Course Code & Course Name	Course outcome	
GE8291 ENVIRONMENTAL SCIENCE AND ENGINEERING	CO1	Identify Environment, ecosystem and biodiversity, classify types of ecosystems and outline the impacts to biodiversity.
	CO2	List out the pollution, classify its types, analyse the causes and suggest control measures for pollution.
	CO3	Categorize various natural resources; explain causes and impacts of destruction of resources.
	CO4	List various social issues related to land, water and energy; summarize the concerning government acts and rules to overcome these problems
	CO5	Analyze population explosion, variation among nations, show the impacts of over population and illustrate the methods to mitigate the same.
EC8461 CIRCUITS DESIGN AND SIMULATION LABORATORY	CO1	Identify the different types of topologies in feedback amplifiers
	CO2	Design of oscillators, tuned amplifiers, wave-shaping circuits and multivibrators.
	CO3	Design and simulate feedback amplifiers, oscillators, tuned

		amplifiers using SPICE Tool.
	CO4	Design and simulate double tuned and stagger tuned amplifiers using SPICE Tool.
	CO5	Design and simulate wave-shaping circuits and multivibrators using SPICE Tool.
Course Code & Course Name	course outcome	
EC8462 LINEAR INTEGRATED CIRCUITS LABORATORY	CO1	Apply appropriate methods to conduct the experiment in Inverting and NON inverting amplifier, oscillators, A-D converter using operational amplifier.
	CO2	Discuss the application of operational amplifier to perform the frequency response.
	CO3	Demonstrate an experimental approach for working of PLL and frequency multiplier
	CO4	Design and develop different data conversion circuits using ICs.
	CO5	Analyze software tools the performance of Analog multiplier, A/D converters, Filters and Multivibrators circuits using SPICE simulation.
Semester - V		
EC8501 DIGITAL COMMUNICATION	CO1	Design of source coding techniques for Communication Systems and Learn the basic concepts of Information theory.
	CO2	Compare various encoding techniques and find power spectral density using principles of mathematics.
	CO3	Analyse the methods involved in Baseband signal Transmission and Reception in engineering science.
	CO4	Compare different digital modulation schemes and their different parameters.
	CO5	Infer various channel coding and error coding techniques in digital communication.
Course Code & Course Name	Course outcome	
EC8551 COMMUNICATION NETWORKS	CO1	Classify the components required to build different types of networks
	CO2	Explain about the functionality at each layer for given application
	CO3	Uses of solution for each functionality at each layer
	CO4	Implementation about the flow of information from one node to another node in the network
	CO5	Differentiate about various routing algorithms
TOTAL QUALITY MANAGEMENT	CO1	Explain the contributions of Quality Guru.
	CO2	Explain the principles of TQM.
	CO3	Apply the tools and techniques of quality management to manufacturing and service processes.
	CO4	Describe TQM tools and techniques such as Cost of Quality, QFD and TPM.
	CO5	Develop the elements of Quality system standards.
Course Code & Course Name	Course outcome	

BASICS OF BIOMEDICAL INSTRUMENTATION	CO1	Define certain engineering fundamentals to the different bio potential and its propagation.
	CO2	Identify the engineering principles to different electrode placement for various physiological recording.
	CO3	Apply the methods to formulate modules of a system various bio amplifier for various physiological recording
	CO4	Examine appropriate instrumentation to make measurements of non-electrical parameters in human body
	CO5	Implement the need analysis to the different biochemical measurements
EC8562 DIGITAL SIGNAL PROCESSING LABORATORY	CO1	Classify the basic signal processing techniques
	CO2	Design and implement of FIR & IIR filters using MATLAB
	CO3	Demonstrate their abilities towards MATLAB based implementation of various DSP system
	CO4	Analyze architecture of a DSP processor.
	CO5	Build the signal processing concept like FIR & IIR using DSP processor
Course Code & Course Name	Course outcome	
EC8561 COMMUNICATION SYSTEMS LABORATORY	CO1	Apply the knowledge of communication to Design and verify the sampling and TDM circuits.
	CO2	Design and verify the AM, FM modulation and demodulation.
	CO3	Analyze the working principles of PCM, DM, ADM and demodulation circuits.
	CO4	Demonstrate base band transmission schemes such as ASK,BPSK,QPSK,QAM and DPSK
	CO5	Apply various channel coding schemes such as linear block code, Cyclic error control code and demonstrate the improvement of noise performance.
EC8563 COMMUNICATION NETWORKS LABORATORY	CO1	Demonstrate the communication between desktop computers and understand the IP configuration.
	CO2	Create scenario and study the performance of network with CSMA / CA protocol and compare with CSMA/CD protocols.
	CO3	Develop different types of protocol like Stop and Wait Protocol, sliding window, Go back-N and selective repeat protocol.
	CO4	Compare the performances of various routing algorithms such as link state and distance vector.
	CO5	Analyze the characteristics of various network topologies through NS-2 simulation

### Semester - VI

Course Code & Course Name	Course outcome	
	CO1	Apply the programming knowledge to understand the functions of 8086 architecture, different types of instruction set, addressing modes.
	CO2	Identify the functionalities of various configuration of 8086 and system bus structures.
	CO3	Develop the assembly language programs of interfacing with I/O and memory in 8086.

EC8691 MICROPROCESSORS & MICROCONTROLLERS	CO4	Apply the programming knowledge to understand the 8051 architecture, different types of instruction set, addressing modes.
	CO5	Develop the Programme for various types of microcontrollers in 8051.
EC8095 VLSI DESIGN	CO1	Understand the fundamentals of CMOS circuits and its characteristics.
	CO2	Design the Combinational digital logic circuits in MOS Transistor and understand the concept of Power strategies.
	CO3	Design and analysis of Sequential digital circuits and understand the concept of timing issues in MOS circuits
	CO4	Develop the arithmetic building blocks and subsystem in CMOS technology
	CO5	Design and Implementation of FPGA design flow and testing of VLSI circuits.
Course Code & Course Name	Course outcome	
EC8652 WIRELESS COMMUNICATION	CO1	Find the performance of path loss models with fading and dispersion fading.
	CO2	Explain the concept of different multiple access techniques & principles of cellular system.
	CO3	Compare the performance of fading channels with QPSK, MSK, GMSK & OFDM techniques.
	CO4	Analyze the mitigation techniques and performance of RAKE receiver.
	CO5	Demonstrate various multiple antenna techniques.
MG8591 PRINCIPLES OF MANAGEMENT	CO1	Apply fundamental engineering concepts to the Functions of Management and various Business Organizations Sectors.
	CO2	illustrate the relevant methods to the concept of planning in the organization for achieving the Objectives in an effective manner
	CO3	Discuss the identify engineering systems the types of organization structures and the functions of human resource management.
	CO4	Analyze functional requirements to the Leadership theories, Motivation Techniques and Communication Process in an organization to be an effective manager.
	CO5	Compose different types of the Controlling Techniques towards increasing productivity in an organization.
Course Code & Course Name	Course outcome	
EC8651 TRANSMISSION LINES AND RF SYSTEMS	CO1	Interpret the various types of transmission lines and propagation of signals
	CO2	Examine the standing wave ratio and input impedance in high frequency transmission lines
	CO3	Make use of smith chart to determine impedance matching by stubs.
	CO4	Apply the Maxwell's equation to determine the characteristics of TE and TM waves in different waveguides.
	CO5	Inferences about RF transceiver system for wireless communication

EC8004 WIRELESS NETWORKS	CO1	Apply various architecture and protocol layers of Wireless LAN, Bluetooth and Zigbee to solve the problems in communication networks.
	CO2	Examine the implementation of mobile network layer and Adhoc routing in wireless networks.
	CO3	Outline the fundamentals of 3G networks services and its applications.
	CO4	Demonstrate the concept of inter networking of WLAN and WWAN.
	CO5	Develop prototypes for applications for smart phones and mobile devices with latest network strategies.

Course Code & Course Name	Course outcome	
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EC8681 MICROPROCESSORS AND MICROCONTROLLERS LABORATORY	CO1	Apply engineering principle to implement the ALP Program for arithmetic operations using 8086 Microprocessor.
	CO2	Illustrate to conduct the experiment for interface the different I/O's with Microprocessor.
	CO3	Design and develop appropriate procedures to generate different type's waveforms using Microprocessor.
	CO4	Create the program of 8051 microcontroller for interfacing with external devices.
	CO5	Analyze the results using contemporary tools of difference between simulator and Emulator.

EC8661 VLSI DESIGN LABORATORY	CO1	Develop the Hardware Descriptive Language code for basic as well as advanced digital Integrated circuits.
	CO2	Import the logic modules into FPGA Boards.
	CO3	Perform the Synthetization, place and Route the digital IPs.
	CO4	Design, simulate and extract the layouts of Digital and Analog IC Block using EDA tools.
	CO5	Simulate the modern chip manufacturing software tools.

Course Code & Course Name	Course outcome	
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EC8611 TECHNICAL SEMINAR	CO1	Apply recent trends in engineering and technology.
	CO2	Identify health, safety, social & environmental issues in engineering with Ethics.
	CO3	Interpret seminar report and presentation.
	CO4	Develop technical content with PPT and demonstrative models.
	CO5	Select lifelong learning in the context of technology

PROFESSIONAL COMMUNICATION	CO1	Build Employability and carrier skills with professional values
	CO2	Demonstrate general and technical presentations
	CO3	Organize Group Discussions.
	CO4	Perceive interviews etiquette
	CO5	Plan long term carrier management professionally.

Semester – VII		
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Course Code & Course Name	Course outcome	
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EC8701 ANTENNAS AND MICROWAVE ENGINEERING	CO1	Describe the fundamental concepts of microwave systems and antenna parameters.
	CO2	Examine the various radiation mechanisms and design aspects.
	CO3	Illustrate the antenna array and application.
	CO4	Apply the concepts of different active and passive microwave devices
	CO5	Apply the microwave design principles.
EC8751 OPTICAL COMMUNICATION	CO1	Identify the functionalities of basic elements in optical fibers, different modes and configurations
	CO2	Analyze the transmission characteristics associated with dispersion and polarization techniques.
	CO3	Compare the optical sources and detectors with their use in optical communication system.
	CO4	Construct fiber optic receiver systems, measurement of power, attenuation, dispersion and coupling techniques.
	CO5	Analyze the different optical communication networks such as SONET, SDH, OADM & Ethernet.
Course Code & Course Name	Course outcome	
EC8791 EMBEDDED AND REAL TIME SYSTEMS	CO1	Identify the embedded system design process and features of ARM processors with its performance.
	CO2	Interpret the ARM processors architecture and peripherals with its performance.
	CO3	Apply various scheduling and optimization techniques in real time operating systems.
	CO4	Formulate the design flow, data transmission and memory sharing in a multiprocessor based embedded system.
	CO5	Analyze embedded system design process in real time application
EC8702 ADHOC AND WIRELESS SENSOR NETWORKS	CO1	Outline the basics of Ad hoc and Wireless Sensor Networks also classify the routing protocols.
	CO2	Build the single node architecture of wireless sensor networks and examine with real time applications.
	CO3	Classify the wireless sensor networks protocols and identify appropriate physical and MAC layer protocols.
	CO4	Choose the wireless sensor networks security requirements to solve the issues possible in Ad hoc and sensor networks
	CO5	Experiment with sensor node hardware using node level simulators in wireless Sensor Networks and build basic modules.
Course Code & Course Name	Course outcome	
PROFESSIONAL READINESS FOR INNOVATION, EMPLOYABILITY AND ENTREPRENEURSHIP	CO1	Identify the trained students and ensure they get jobs according to their skill sets also understand the importance of employability and Intrepreneurship
	CO1	Summarize the requirements for formation of systems
	CO2	Classify the basic structural and functional elements of human body
	CO3	Illustrate Skeletal and muscular systems of human

OBM751 BASICS OF HUMAN ANATOMY AND PHYSIOLOGY	CO4	Analyze about the circulatory system and nervous systems and their components
	CO5	Interpret the importance of digestive and urinary systems in Human body
Course Code & Course Name	Course outcome	
EC8711 EMBEDDED LABORATORY	CO1	Apply the concept of Programs writing in ARM processor with evaluate for a specific Application.
	CO2	Demonstrate the Interface memory, A/D and D/A convertors with ARM system
	CO3	Identifying the performance of interrupt in ARM and FPGA
	CO4	Develop the concept of program s in ARM with interfacing keyboard, display, motor and sensor.
	CO5	Design and develop a mini project using embedded system.
EC8761 ADVANCED COMMUNICATION LABORATORY	CO1	Analyze the performance of simple optical link by measurement of losses and Analyzing the mode characteristics of fiber.
	CO2	Demonstrate the measurement method of losses, bandwidth and attenuation of the given fiber optic cable
	CO3	Analyze the Eye Pattern, Pulse broadening of optical fiber and the impact on BER
	CO4	Estimate the Wireless Channel Characteristics and Analyze the performance of Wireless Communication System
	CO5	Examine the microwave power characteristics and S-parameters of isolator, circulator and Tees
<b>Semester – VII</b>		
Course Code & Course Name	Course outcome	
EC8072 ELECTROMAGNETIC INTERFERENCE & COMPATIBILITY	CO1	Illustrate the various types and mechanisms of Electromagnetic Interference
	CO2	Explain about suitable mitigation technique
	CO3	Uses of filters, transformers and cables.
	CO4	Identify noises from relays and switches used in EMC design for circuits & PCBs
	CO5	Examine various EMC standards and methods to measure them.
EC094 SATELLITE COMMUNICATION	CO1	Outline the basic concepts of satellite orbits and elaborate the launching methodologies.
	CO2	Categorize various earth segment and space segment modules in the satellite system.
	CO3	Inspect the Satellite link budget and its system performance in satellite system.
	CO4	Identify the suitable method of modulation and multiple access techniques for effective communication in satellite network.
	CO5	Apply various communication techniques for real time applications in satellite system.

## Semester – VIII

Course Code & Course Name	Course outcome	
EC8811 PROJECT WORK	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 OUTCOMES  
REGULATION 2017

Semester - I		
Course Code & Course Name	Course outcome	
MA5152 Applied Mathematics for Electronics Engineers	CO1	Concepts of fuzzy sets, knowledge representation using fuzzy rules, fuzzy logic, fuzzy prepositions and fuzzy quantifiers and applications of fuzzy logic
	CO2	Apply various methods in matrix theory to solve system of linear equations
	CO3	Computation of probability and moments, standard distributions of discrete and continuous random variable with Using discrete time Markov chains to model computer systems and functions of a random variable
	CO4	Conceptualize the principle of optimality and sub-optimization, formulation and computational procedure of dynamic programming
	CO5	Exposing the basic characteristic features of a queuing system and acquire skills in analyzing queuing models
AP5151 Advanced Digital System Design	CO1	Analyze and design sequential digital circuits
	CO2	Identify the requirements and specifications of the system required for a given application
	CO3	Analyze and design of Combinational circuits
	CO4	Analyze and design synchronous and asynchronous sequential circuits
	CO5	design and implementation of digital circuits using programming tools
VL5101 CMOS Digital VLSI Design	CO1	Carry out transistor level design of the most important building blocks used in digital CMOS VLSI circuits.
	CO2	Analyze and design of Combinational and sequential circuits
	CO3	Analyze tradeoffs of the various circuit choices for each of the building block.
	CO4	Analyze the Interconnect and Clocking strategies.
	CO5	Discuss design methodology of arithmetic building block
VL5191 DSP Integrated Circuits	CO1	Get to know about the Digital Signal Processing concepts and its algorithms
	CO2	Get an idea about finite word length effects in digital filters
	CO3	Concept behind multi rate systems is understood.
	CO4	Get familiar with the DSP processor architectures and how to perform synthesis of processing elements
	CO5	Design of Arithmetic unit and processing elements.
	CO1	Concepts of VLSI Design methodologies
	CO2	Understand VLSI design automation tools
	CO3	Outline floor planning and routing

VL5102 CAD for VLSI Circuits	CO4	Explain Simulation and Logic Synthesis
	CO5	Discuss the hardware models for high level synthesis
VL5103 Analog IC Design	CO1	To study MOS devices modelling and scaling effects.
	CO2	To design MOS single stage and OPAMP for desired frequencies
	CO3	To design MOS multistage amplifiers and OPAMP for desired frequencies
	CO4	Design of single stage and multistage MOS amplifier and analysis their frequency responses.
	CO5	Analyze Stability, frequency response, and Noise in MOS amplifiers
VL5111 VLSI Design Lab I	CO1	Given a digital system specification, the student should be able to map it onto FPGA platform
	CO2	Carry out a series of validations design starting from design entry to hardware testing
	CO3	Design and carry out time domain and frequency domain
	CO4	Simulations of simple analog building blocks, study the pole zero behaviors of feedback based circuits and compute the input impedances.
	CO5	Simulations of simple analog building blocks, study the pole zero behaviors of feedback based circuits and compute the output impedances.
<b>Semester – II</b>		
VL5201 Testing of VLSI Circuits	CO1	Learn test generation for sequential and combinational logic circuits
	CO2	Discuss test algorithms
	CO3	Explain fault diagnosis
	CO4	Understand logic fault models
	CO5	Prepare design for testability
VL5291 VLSI Signal Processing	CO1	To introduce techniques for altering the existing DSP structures to suit VLSI implementations.
	CO2	Determine the parameters influencing the efficiency of DSP architectures and apply pipelining and parallel processing techniques to alter FIR structures
	CO3	Analyze and modify the design equations leading to efficient DSP architectures
	CO4	To introduce efficient design of DSP architectures suitable for VLSI
	CO5	Ability to modify the existing or new DSP architectures suitable for VLSI
VL5202 Low Power VLSI Design	CO1	know the basics and advanced techniques in low power design which is a hot topic in today's market where the power plays major role
	CO2	The reduction in power dissipation by an IC earns a lot including reduction in size, cost and etc.
	CO3	Identify sources of power in an IC.
	CO4	Identify the power reduction techniques based on technology independent and technology dependent
	CO5	Identify suitable techniques to reduce the power dissipation.
	CO1	Understand the concept of network - on - chip

VL5005 NETWORKS ON CHIP	CO2	Learn router architecture designs
	CO3	Compare different architecture design
	CO4	Discuss different routing algorithms
	CO5	Explain three dimensional networks - on-chip architectures
VL5008 SELECTED TOPICS IN ASIC DESIGN	CO1	Concepts of semi-custom IC Design and introduces the principles of design logic cells
	CO2	Gained knowledge in the circuit design aspects at the next transistor and block level abstractions of FPGA
	CO3	gained knowledge in the circuit design aspects at the next transistor and block level abstractions of ASIC design
	CO4	Gained sufficient theoretical knowledge for carrying out FPGA design.
	CO5	Gained sufficient theoretical knowledge for carrying out ASIC design
VL5211 VLSI Design Lab II	CO1	Designed to bring out the key aspects of simulation, and power and clock routing modules. ASIC RTL realization.
	CO2	Create a UVM test bench structure using the UVM library base classes and the UVM factory
	CO3	Total power estimate. Analog circuit simulation. Simulation of logic gates, Current mirrors, Current sources, Differential amplifier in Spice
	CO4	Develop a register model for your DUT and use the model for initialization and accessing DUT registers
	CO5	Hands on experience in the carrying out a complete VLSI based experiments using / CADENCE/ TANNER/ Mentor/Synopsis
<b>Semester – III</b>		
VL5301 Analog to Digital Interfaces	CO1	Understand the importance of sampling the input analog signal for digitization and enabling circuit architectures
	CO2	To understand the principles of Analog to Digital and Digital to Analog conversion of signals.
	CO3	To understand the importance of calibration techniques for achieving precision during data conversion
	CO4	Design of Switched Capacitor Circuits and Comparators.
	CO5	Design Analog to Digital and Digital to Analog data converters based on data precision requirements
AP5292 DIGITAL IMAGE PROCESSING	CO1	Understand fundamentals of digital images
	CO2	Learn different image transforms
	CO3	Understand various image enhancement techniques
	CO4	Explain color image processing
	CO5	Compare image compression schemes
VL5012 SELECTED TOPICS IN IC DESIGN	CO1	Concepts of supply circuit modules which are crucial modules in an IC design.
	CO2	Knowledge of High Speed Broad Band Communication circuits
	CO3	Design of Oscillator Fundamentals and Phase locked loops
	CO4	Designer to construct Supply reference circuits and Clock Generation Circuits for given design specifications.
	CO5	Knowledge of High Speed I/Os, Memory modules and Data Conversion Circuits