



Graduate School of
Technology

RISE WITH EDUCATION

DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION

Course Outcomes

SE : III SEM (REV- 2019 'C' Scheme)

Subject- Engineering Mathematics III, Course Code- ECC301

CO1	Find Laplace transform and inverse Laplace transform of functions using the properties
CO2	Find inverse Laplace transform using convolution theorem and partial fraction method
CO3	Expand periodic functions using Fourier series, understand the concept of half range sine and cosine series and Parseval's Identity
CO4	Understand the concept of complex variable, analytic functions, harmonic functions and harmonic conjugates
CO5	Use matrix algebra to solve the engineering problems.
CO6	Apply the concepts of vector calculus in real life problems

Subject- Electronic Devices & Circuits, Course Code- ECC302

CO1	Explain working of various electronics devices with the help of V-I characteristics and also know their applications
CO2	Analyze and design dc biasing circuits of transistors (BJT, FET)
CO3	Analyze BJT, FET amplifiers and derive their performance parameters
CO4	Evaluate the Time and Frequency response of BJT and FET amplifier
CO5	Analyze various power amplifier circuits
CO6	Analyze various differential amplifier circuits

Subject- Digital System Design, Course Code- ECC303

CO1	Solve conversion for various number system
CO2	Develop digital logic for digital circuits and logic families
CO3	Analyze, design and implement combinational logic circuits
CO4	Analyze, design and implement sequential logic circuits
CO5	Classify different types of memories and PLDs
CO6	Implement combinational and sequential circuits using VHDL

Subject- Network Theory, Course Code- ECC304

CO1	Apply network theorems to analyse circuits with dependent sources.
CO2	Analyse the DC circuits in time & frequency domain.
CO3	Analyse ladder & non Ladder circuits using network functions.
CO4	Analyse two port networks using various parameters.
CO5	Synthesize the network using passive elements.
CO6	Analyse Electrical Networks using Graph theory.

Subject- Electronic Instrumentation & Control Systems, Course Code- ECC305

CO1	Describe the method and characteristics of measuring instruments.
CO2	Explain principle of operation of various sensors & transducers.
CO3	Determine the models of physical systems in forms suitable for use in analysis and design of control system.
CO4	Implement different techniques for finding transfer function of a given system
CO5	Analyse the stability of a given system in time domain
CO6	Analyse the stability of a given system in frequency domain

Subject- Electronic Devices & Circuits Lab, Course Code- ECL301

CO1	Analyze regulator circuit characteristics
CO2	Analyze the characteristics of BJT & FET.
CO3	Analyze DC biasing circuit of BJT.
CO4	Analyze and compare single stage and multistage RC coupled amplifier
CO5	Analyze power amplifier
CO6	Analyze response of Differential amplifier

Subject- Digital System Design Lab, Course Code- ECL302

CO1	Identify various digital ICs and basic building blocks of digital system design
CO2	Analyze and minimize the digital circuits
CO3	Design and implement combinational circuits like adder, subtractor, multiplexer, code converters etc.
CO4	Identify various types of flip flops and implement their inter conversions
CO5	Design and implement basic sequential circuits such as counters
CO6	Acquire basic knowledge of VHDL/Verilog basic programming

Subject- Electronic Instrumentation & Control Systems Lab, Course Code- ECL303

CO1	Demonstrate performance characteristics of transducers.
CO2	Demonstrate the characteristics of various Sensors.
CO3	Analyse DC Bridges for resistance Measurement.
CO4	Analyse Open loop and close loop control systems
CO5	Simulate the Time domain response of second order systems.
CO6	Simulate the frequency response specifications of systems by using bode-plot.

Subject- Skill Lab: C++ and Java Programming, Course Code- ECL304

CO1	Describe the basic principles of OOP.
CO2	Design and apply OOP principles for effective programming.
CO3	Develop programming applications using OOP language.
CO4	Implement different programming applications using packaging.
CO5	Analyze the strength of OOP.
CO6	Percept the Utility and applicability of OOP.

Subject- Mini Project 1A, Course Code- ECM301

CO1	Apply the knowledge and skills learned out of courses studying to implement Predefined practical problem
CO2	Design and Simulate the circuit
CO3	Develop ability to define and design the problem and lead to its accomplishment with proper planning
CO4	Learn the behavioral science by working in a group
CO5	Troubleshoot, fault detection and correction of hardware part of projects
CO6	Write a technical report describing the details of the project

SE : IV SEM (REV- 2019 'C' Scheme)

Subject- Engineering Mathematics IV, Course Code- ECC401

CO1	Evaluate integral using Cauchy's theorem, Residue theorem
CO2	Apply the concept of correlation and regression to find correlation coefficient, rank correlation and regression lines
CO3	Find the probability using Bayes' theorem and the probability distributions
CO4	Apply Gram Schmidt processes for orthogonalization a set of vectors.
CO5	Reduce the Quadratic form to a canonical form using congruent and orthogonal transformations
CO6	Apply method of calculus of variations to maximize or minimize functional by Euler–Lagrange equation

Subject- Microcontrollers, Course Code- ECC402

CO1	Explain computer & Processor based system
CO2	Explain Memory system
CO3	Describe internal architecture of 8051
CO4	Design microcontroller based system with help of interfacing peripheral devices & ALP.
CO5	Describe internal architecture & instruction set for Arm 7
CO6	Explain applications of 8 bit microcontroller

Subject- Linear Integrated Circuits, Course Code- ECC403

CO1	Analyze different configurations of operational amplifier with and without feedback.
CO2	Analyze and Design solutions for linear applications using op-amp.
CO3	Analyze and design solutions for non linear applications using op-amp.
CO4	Design Astable and Monostable Multivibrator using IC555 Timer.
CO5	Describe working and design different types of voltage regulators.
CO6	Explain working principle of the special purpose integrated circuits and its applications.

Subject- Signals & Systems, Course Code- ECC404

CO1	Analyze various types of signals and systems
CO2	Analyze continuous time and discrete time systems in time domain
CO3	Analyze continuous time and discrete time signals using Fourier Series and Fourier Transform
CO4	Analyze continuous time LTI systems using Laplace Transform
CO5	Analyze discrete time LTI systems using Z-transform
CO6	Analyze state space equations and to realize discrete time structures

Subject- Principles of Communication Engineering, Course Code- ECC405

CO1	Explain the basics of communication system and noise
CO2	Analyze the concepts of amplitude modulation and demodulation and its applications
CO3	Analyze the concepts of angle modulation and demodulation and its applications
CO4	Compare the performances of AM and FM receivers
CO5	Compare analog and digital pulse modulation techniques
CO6	Explain TDM, FDM and its applications

Subject- Microcontrollers Lab, Course Code- ECL401

CO1	Write assembly language program for performing arithmetic and logical operations using 8051 microcontroller.
CO2	Apply the knowledge of mathematics and assembly language programming to perform the numbers conversion using 8051 microcontroller.
CO3	Transfer the block of data from one memory location to other memory location using assembly language programming and 8051.
CO4	Develop assembly language program for performing input output operation, serial communication and delay generation using 8051 microcontroller.
CO5	Apply the knowledge of interfacing to interface display device with 8051 microcontroller.
CO6	Design projects based on microcontroller.

Subject Linear Integrated Circuits Lab, Course Code- ECL402

CO1	Implement the basic applications of Op-amp.
CO2	Design practical circuits that perform the desired operations by selecting appropriate linear ICs.
CO3	Simulate different circuits for given application using appropriate tool.
CO4	Design simple applications using timer and voltage regulator ICs
CO5	Implement mini project using the concepts learned in LIC

Subject- Principles of Communication Engineering Lab, Course Code- ECL403

CO1	Analyze different analog modulation techniques
CO2	Verify sampling theorem for low pass signals

CO3	Analyze different digital pulse modulation techniques
CO4	Analyze different analog pulse modulation techniques
CO5	Demonstrate multiplexed signal

Subject- Skill Lab: Python Programming, Course Code- ECL404

CO1	Apply basic concepts of python like data types (strings, list, array, dictionaries, set, tuples) and control statements.
CO2	Illustrate different Functions and File I/O Handling operations.
CO3	Interpret object oriented programming in Python and to illustrate various data structures.
CO4	Design GUI using Tkinter Library and perform CRUD operations using SQLite Database connection.
CO5	Express proficiency in the handling Python libraries for data science.
CO6	Perform machine learning applications and to develop good communication skills and teamwork through mini project

Subject- Mini Project 1B, Course Code- ECM401

CO1	Write basic codes for the Arduino board using the IDE for utilizing the onboard resources.
CO2	Apply the knowledge of interfacing different devices to the Arduino board to accomplish a given task.
CO3	Design Arduino based projects for a given problem.
CO4	Write a code using python language using IDE for utilizing the onboard resources.
CO5	Apply the knowledge of interfacing different devices to raspberry Pi board to accomplish a given task.
CO6	Design Raspberry Pi based projects for a given problem.

TE : V SEM (REV- 2019 'CBCS' Scheme)

Subject- Digital Communication, Course Code- ECC501

CO1	Apply the concepts of information theory in source coding.
CO2	Compare different error control systems and apply various error detection codes.
CO3	Analyze different error correction codes
CO4	Compare various baseband transmission methods for digital signals
CO5	Evaluate the performance of optimum baseband detection in the presence of white noise
CO6	Compare the performances of different digital modulation techniques

Subject- Discrete Time Signal Processing, Course Code- ECC502

CO1	Apply Discrete Fourier Transform (DFT), Fast Fourier Transform (FFT) and its properties for frequency domain analysis.
CO2	Compare analog and digital filters and can design IIR type digital filters.
CO3	Analyse and design FIR type digital filters.

CO4	Realize structures for digital filters.
CO5	Analyze the effect of hardware limitations on performance of digital filters.
CO6	Apply signal processing concepts, algorithms in applications related to the field of biomedical and audio signal processing.

Subject- Digital VLSI, Course Code- ECC503

CO1	Explain MOSFET operation from VLSI design perspective
CO2	Analyze static and dynamic characteristics of CMOS inverter with operation
CO3	Design, implement and verify combinational and sequential circuits using various MOS design style
CO4	Apply concept of CMOS for implementation of semiconductor memories
CO5	Describe data path and system design issues
CO6	Apply RTL design for given application

Subject- Random Signal Analysis, Course Code- ECC504

CO1	Apply theory of probability in identifying and solving relevant problems.
CO2	Differentiate continuous and discrete random variables and their distributions.
CO3	Analyze mean, variance, and distribution function of random variables and functions of random variables
CO4	Define a random process, determine the type of the process and find the response of LTI system for WSS process
CO5	Explain linear regression algorithms and apply for predictive applications

Subject- Data Compression and Cryptography, Course Code- ECCDL05012

CO1	Apply various compression techniques for text and understand image compression and its standards.
CO2	Select suitable compression techniques for specified lossless and lossy audio and video applications.
CO3	Compare between symmetric and asymmetric cryptography and describe different symmetric cryptographic techniques and standards.
CO4	Apply number theory concepts to solve cryptographic problems
CO5	Analyze different public key cryptography algorithms and describe methods that provide the goal for integrity, confidentiality and authentication
CO6	Describe system security facilities designed to protect a computer system from security threats and appreciate ethical issues related to system security

Subject- Data Structures and Algorithm, Course Code- ECCDL05014

CO1	Introduce the fundamental knowledge & need of Data Structures.
CO2	Abstract the concept of Algorithm and these concepts are useful in problem solving.
CO3	Implement fundamental knowledge and applications of Stack, Queue, Linked List, Trees, Graphs etc.
CO4	Understand the working of different Sorting, Searching & Hashing techniques

CO5	Become familiar with various Sorting and Searching Algorithms and their performance characteristics.
CO6	To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental

Subject- Sensor Technology, Course Code- ECCDLO5015

CO1	Understand the transduction principal of various sensors.
CO2	Select sensors suitable for required application
CO3	Analyze working of MEMS sensor and actuator
CO4	Analyze wireless sensing techniques
CO5	Design the data acquisition system and Identify signal conditioning method for particular application.
CO6	Create an application using various sensor technologies

Subject- Digital Communication Lab, Course Code- ECL501

CO1	Compare various source coding schemes
CO2	Design and implement different error detection codes
CO3	Design and implement different error correction codes
CO4	Compare various line coding techniques
CO5	Illustrate the impulse response of a matched filter for optimum detection
CO6	Demonstrate various digital modulation techniques

Subject- Discrete Time Signal Processing Lab, Course Code- ECL502

CO1	Perform basic discrete time signal processing operations such as Linear Convolution, Circular Convolution, Auto Correlation, Cross Correlation, etc. and interpret the results.
CO2	Demonstrate their ability towards interpreting and performing frequency analysis of different discrete time sequences and systems.
CO3	Design and implement the FIR and IIR Filters for given specifications.
CO4	Implement and analyse applications related to the field of biomedical signal processing and audio signal processing.

Subject- Digital VLSI Lab, Course Code- ECL503

CO1	Design a spice code for given circuit
CO2	Implement schematics of different CMOS circuit
CO3	Design layout of different CMOS circuit
CO4	Analyze rise and fall time of circuit
CO5	Implement CMOS based semiconductor memories
CO6	Implement RTL Design using EDA tool

Subject- Professional Communication & Ethics - II, Course Code-ECL 504

CO1	Plan and prepare effective business/ technical documents which will in turn provide solid foundation for their future managerial roles.
CO2	Strategize their personal and professional skills to build a professional image and meet the demands of the industry
CO3	Emerge successful in group discussions, meetings and result-oriented agreeable solutions in group communication situations.
CO4	Deliver persuasive and professional presentations
CO5	Develop creative thinking and interpersonal skills required for effective professional communication
CO6	Apply codes of ethical conduct, personal integrity and norms of organizational behavior.

Subject- Mini Project 2A Embedded System Project, Course Code- ECM501

CO1	Understand the embedded systems with design metrics.
CO2	Understand microcontrollers and programming in Embedded C.
CO3	Implementation of Embedded systems with different sensors and peripherals as IoT.
CO4	Implementation of Embedded systems with different communication protocols as IoT.
CO5	Analyze concepts of Real time operating systems.
CO6	Design embedded system applications using sensors, peripherals and RTOS

TE : VI SEM (REV- 2019 'CBCS' Scheme)

Subject- Electromagnetics and Antenna, Course Code- ECC601

CO1	Describe electromagnetics field including static and dynamic in terms of Maxwell's equations.
CO2	Apply Maxwell's equation to solve various electromagnetic phenomenon such as electromagnetic wave propagation in different mediums, power in EM wave.
CO3	Derive the field equations for the basic radiating elements and describe basic antenna parameters like radiation pattern, directivity, gain etc.
CO4	Design and analyze antenna array for given specifications
CO5	Differentiate the fundamentals of aperture antenna, reflector antenna and microstrip antenna design and their applications.
CO6	Explain various techniques of electromagnetic wave propagation

Subject- Computer Communication Networks, Course Code- ECC602

CO1	Analyze network topologies, hardware devices, addressing schemes and the protocol stacks
CO2	Compare various transmission media and broadband technologies
CO3	Analyze the flow control, error control and the medium access control techniques

CO4	Judge network layer addressing and routing schemes
CO5	Analyze connection oriented and connectionless services
CO6	Apply the knowledge of application layer protocol

Subject- Image Processing and Machine Vision, Course Code- ECC603

CO1	Explain fundamentals of image processing and machine vision
CO2	Enhance the quality of image using spatial and frequency domain techniques for image enhancement
CO3	Apply image morphology and restoration techniques
CO4	Apply image segmentation techniques based on principle of discontinuity and similarity using various algorithms
CO5	Represent boundaries and shapes using standard techniques.
CO6	Classify the object using different classification methods

Subject- Artificial Neural Network and Fuzzy Logic, Course Code- ECC604

CO1	Compare biological neurons and artificial neurons
CO2	Analyze the feed-forward and feedback neural networks and their learning algorithms
CO3	Explain the neural networks training and design concepts
CO4	Analyze the application of neural networks to real world problem
CO5	Design a simple CNN model and apply in image classification
CO6	Design fuzzy logic to real world problems

Subject- Database Management System, Course Code- ECCDLO6014

CO1	Describe different issues involved in the design and implementation of a database system.
CO2	Explain basic concepts and various data model used in database design.
CO3	Develop an information model into a relational database schema and use a data definition language to implement it.
CO4	Explain and formulate relational algebra query.
CO5	Explain concept of constraints, views, triggers.
CO6	Describe basic issues of transaction processing and concurrency control.

Subject- IoT and Industry 4.0, Course Code- ECCDLO6015

CO1	Explain fundamentals of Internet of Things, Machine to Machine and its building blocks along with their characteristics
CO2	Illustrate various communication protocols of web connectivity.
CO3	Explain the concepts and use tools for data management and analytics in IoT.
CO4	Explain various frameworks and concepts for industry 4.0 standards.
CO5	Illustrate various concepts of IIOT.
CO6	Explain advanced concepts and applications of industry 4.0 and 5.0

Subject- Digital Forensic, Course Code- ECCDLO6013

CO1	Study the various cybercrimes and its prevention methods.
CO2	Discuss the phases of Digital Forensics and methodology to handle the computer security incident.
CO3	Understand the process of collection, analysis and recovery of the digital evidence.
CO4	Explore various tools to perform the investigation of the crime scenario.
CO5	Investigate the process of monitoring and analysis of computer network traffic for network investigation.
CO6	Discuss the legal issues associated with the cyber laws.

Subject- Electromagnetics and Antenna Lab, Course Code- ECL601

CO1	Determine antenna parameters using various measuring instruments and classify types of antennas
CO2	Distinguish types of wire antennas based on their directivity.
CO3	Determine radiation pattern of array antenna and compare with wired antennas.
CO4	Simulate and analyze parameters of monopole and loop antenna.
CO5	Design microstrip antenna using simulation tool.
CO6	Compare and summarize characteristics of advanced MSA for various applications.

Subject- Computer Communication Networks Lab, Course Code- ECL602

CO1	Design a small or medium sized computer network including media types, end devices, and interconnecting devices that meets customers specific needs.
CO2	Perform basic configurations on routers and Ethernet switches.
CO3	Demonstrate knowledge of programming for network communications.
CO4	Simulate computer networks and analyse the simulation results.
CO5	Troubleshoot connectivity problems in a host occurring at multiple layers of the OSI model.
CO6	Develop knowledge and skills necessary to gain employment as a computer n/w engineer and administrator.

Subject- Image Processing and Machine Vision Lab, Course Code- ECL603

CO1	Apply point processing and histogram processing techniques to the given image
CO2	Perform enhancement of digital images in spatial and frequency domain
CO3	Perform edge detection and morphological operations on digital images
CO4	Perform segmentation of digital images
CO5	Classify patterns using standard Machine vision classification techniques
CO6	Apply theoretical knowledge in image processing and machine vision to practical case studies

Subject- Skill Lab: Linux and Networking and Server Configuration, Course Code- ECL 604

CO1	Understand installation of Linux and implement standard Linux commands
CO2	Study basic theory of Linux Operating System
CO3	Implement the system administrative functionality

CO4	To write shell script programs to solve problems
CO5	Study basic commands of networking
CO6	Develop implementation skill of different servers on Linux

Subject- Mini Project 2B- FPGA based Project, Course Code- ECM601

CO1	Understand various FPGA families and method of FPGA synthesis and implementation.
CO2	Learn the working of basic EDA tools like Xilinx, Modelsim cadence , etc.
CO3	Program, Simulate and synthesize circuits in Verilog HDL
CO4	Interface LED, switches and seven segment with FPGA
CO5	Document project , designing and handling techniques.
CO6	Analysis of FPGA fault detection and verification principles

BE : VII SEM (REV- 2016 'CBCGS' Scheme)

Subject- Microwave Engineering, Course Code- ECC701

CO1	Characterize devices at higher frequencies.
CO2	Analyze waveguide and passive devices.
CO3	Analyze the microwave components and design the tuning and matching networks by using smith chart.
CO4	Design and analyze microwave circuits.
CO5	Analyze amplifiers and oscillators at microwave frequencies.
CO6	Demonstrate skills of planning, design and deployment of microwave networks.

Subject- Mobile Communication System; Course Code- ECC702

CO1	Design cellular systems and their estimate the coverage and capacity.
CO2	Analyse the link budget and classify different types of propagation models.
CO3	Compare and Analyse mobile communication generations 2G, 2.5G, 3G w.r.t their architectures, frame structures, system capacity, services provided, characteristics and limitations.
CO4	Apply the concepts of 3G technologies of UMTS and CDMA 2000.
CO5	Elaborate the principles of 3GPP LTE
CO6	Apply the mobile communication concepts to study the emerging technologies required for 4th generation mobile systems such as Cognitive Radio and MIMO.

Subject- Optical Communication, Course Code- ECC703

CO1	Apply the fundamental principles of optics and light wave to design optical fiber communication systems.
CO2	Differentiate losses in optical fiber link and explain transmission characteristics of optical fiber.
CO3	Describe working principles and characteristics of various sources to develop the optical fiber systems.

CO4	Explain working principles and characteristics of various detectors to develop the optical fiber systems.
CO5	Explain working principles and characteristics of various fiber optic components.
CO6	Calculate parameters for optical link budgeting to design & analyze the optical fiber link.

Subject- Neural Networks and Fuzzy Logic, Course Code- ECCDLO7031

CO1	Explain the concepts of biological neurons and artificial neurons
CO2	Analyze the feed-forward and feedback neural networks and their learning algorithms.
CO3	Calculate comprehend the neural network training and design concepts
CO4	Analyze the application of neural networks to non linear real world problem
CO5	Explain the concept of fuzziness involved in various systems, fuzzy set theory and fuzzy logic
CO6	Design fuzzy logic to real world problems

Subject- Embedded System, Course Code- ECCDLO7034

CO1	Explain embedded system characteristics, quality attributes, product development life cycle and Create a model for an embedded system using program modeling.
CO2	Compare processor architectures.
CO3	Explain embedded system communication protocols.
CO4	Explain the concepts of operating system, task, process and thread
CO5	Solve scheduling problems in RTOS.
CO6	Design embedded system applications using RTOS

Subject- Product Lifecycle Management, Course Code- ILO7011

CO1	Gain knowledge about phases of PLM, PLM strategies and methodology for PLM feasibility study and PDM implementation.
CO2	Illustrate various approaches and techniques for designing and developing products.
CO3	Apply product engineering guidelines / thumb rules in designing products for moulding, machining, sheet metal working etc.
CO4	Acquire knowledge in applying virtual product development tools for components, machining and manufacturing plant
CO5	Illustrate various environment aspects on product design.
CO6	Demonstrate the relevance between life cycle assessment and life cycle cost analysis.

Subject- Management Information System, Course Code- ILO7013

CO1	Explain the impact of Information Systems on Organisations and Society at large.
CO2	Discuss the implementaion of data and information management in an organisation and the challenges associated with it.

CO3	Describe ethical issues, potential threats to privacy and the methods to protect Information resources.
CO4	Analyse the effect of Social Computing and the ways in which modern organizations use this technology.
CO5	Explain how businesses can use different types of computer networks along with latest technologies.
CO6	Learn the various information systems that modern organizations utilize.

Subject- Operation Research, Course Code- ILO7015

CO1	Apply the techniques used in operations research to formulate a real-world problem and solve it using various problem solving approaches.
CO2	Develop an integrated framework for strategic thinking and problem solving.
CO3	Identify the situations and appropriate equations and mathematical tools needed to solve optimization problems.
CO4	Identify the characteristics of different situations and apply the appropriate decision making tools to be used in each type.
CO5	Gain the ability to recognize situations in a manufacturing environment that suggests the use of certain quantitative methods to assist in optimizing the solution.
CO6	Understand the core features of the operations and production management function and how it contributes to the competitiveness of firms.

Subject- Cyber Security and Laws, Course Code- ILO7016

CO1	Understand the concept of cybercrime and its effect on outside world
CO2	Understand different cyber offences and cyber crime on different environment
CO3	Analyse various tools used in performing cybercrime
CO4	Understand the legal requirement of cyberspace
CO5	Distinguish different aspects of cyber law
CO6	Identify the need for different Information Security Standards compliance during software design and development

Subject- Disaster Management and Mitigation Measures, Course Code- ILO7017

CO1	Understand the natural & man made disaster and its relationships with human activities
CO2	Apply the fundamental knowledge of science and engineering to asses disaster and risk management.
CO3	Develop guidelines and procedures for disaster and safety issues obeying the disaster management laws and regulations.
CO4	Acquire skills for scientific problem-solving related mitigation of disaster.
CO5	Explain simple do's and don'ts in such extreme events and act accordingly.
CO6	Plan of national importance structures based upon the previous history.

Subject- Microwave Engineering Lab, Course Code- ECL701



Graduate School of
Technology

RISE WITH EDUCATION

CO1	Describe and identify various microwave tubes and semiconductor devices construction and their uses in real life.
CO2	Measure the parameters of microwave signal using test bench.
CO3	Measure the parameters of microwave source like GUNN diode and Klystron and plot its characteristics
CO4	Analyze the microwave components and design the tuning and matching networks by using distributed elements using simulation software.
CO5	Analyze the microwave components and design the tuning and matching networks by using lumped elements using simulation software.
CO6	Design the microstrip line and passive components using simulation software.

Subject- Mobile Communication System Lab, Course Code- ECL702

CO1	Simulate the effect of cluster size on system capacity and S/I ratio.
CO2	Implement modulation and multiple access schemes used in mobile communication
CO3	Simulate 2G, 3G and 4G LTE networks
CO4	Simulate Cognitive radio networks
CO5	Design and compare different propagation models
CO6	Research on recent trends in mobile communication.

Subject- Optical Communication Lab -, Course Code- ECL703

CO1	Verify experimentally that attenuation & dispersion are less at longer wavelengths.
CO2	Determine the region of single mode operation of an optical fibers
CO3	Determine the reflectivity of Fiber Bragg Grating in optical Communication Link
CO4	Plot & analyze characteristics of optical source.
CO5	Plot refractive index profile of Graded Index fiber.
CO6	Design optical fiber link for power budgeting

Subject- Embedded System Lab, Course Code- ECLDLO7035

CO1	Write C++ programs for an embedded system.
CO2	Develop a link for wireless communication between two devices using I2C, bluetooth and zigbee communication protocol.
CO3	Construct multiple threads and tasks using RTOS.
CO4	Develop a system by interfacing sensor, display devices and wireless communication protocols with ARM based development board
CO5	Apply the concept of Mutex and Semaphore for solving shared resource problem using RTOS
CO6	Design embedded system projects.

Subject- NNFL Lab, Course Code- ECLDLO7031

CO1	Implement types of neuron activation function.
CO2	Illustrate basic logical operations using MP neural networks
CO3	Develop the logic given in problem statement using perceptron algorithms in NN

CO4	Implement the concept of Backpropagation Algorithm.
CO5	Analyze the application of neural networks to real time systems
CO6	Develop real life applications using Fuzzy Logic in matlab

Subject- Project-I, Course Code- ECL704

CO1	Analyze the quality of problem selected by applying engineering knowledge
CO2	Identify the relevance to the specialization/Industrial trends/Societal and environmental needs
CO3	Plan, design and estimate the cost, feasibility and scope/Techniques/ tools to be used
CO4	Perform extensive literature survey and provide partial solution to the problem by following ethics
CO5	Cultivate the habit of working in team along with financial management
CO6	Prepare, organize and present the documents (Synopsis) and acquired knowledge

BE : VIII SEM (REV- 2016 'CBCGS' Scheme)

Subject- RF Design, Course Code- ECC801

CO1	Design Impedance Matching network for different RF Circuits
CO2	Design passive RF filters
CO3	Design and appraise RF amplifiers
CO4	Design and appraise RF oscillators
CO5	Analyse EMI in RF Circuits
CO6	Analyse EMC in RF circuits

Subject- Wireless Networks, Course Code- ECC802

CO1	Compare various standards and architectures of wireless network
CO2	Compare body area network and personal area network
CO3	Classify different LAN topologies and technologies
CO4	Design the wireless network by illustrating the fundamentals and architecture of metropolitan area networks
CO5	Compare various wireless adhoc network based on architecture , traffic related protocols and transmission technology
CO6	Explain the basic architecture and working of IoT

Subject- Satellite Communication, Course Code- ECCDLO8043

CO1	Explain satellite communication system with respect to various performance parameters.
CO2	Describe the satellite internal sub systems for communication applications
CO3	Analyze link budget of satellite signal for proper communication
CO4	Classify earth station technology with design considerations
CO5	Compare different multiple access systems and its utilization
CO6	Compare competitive satellite services and explain architecture and characteristics for satellite networks.

Subject- Network Management in Telecommunication, Course Code- ECCDLO8044

CO1	Explain basics of telecommunication, networking and information technologies
CO2	Explain the need for interoperable network management & analyze the trends and development of the telecommunications network management.
CO3	Apply concepts and architecture behind standards based network management associated with snmp and cmip
CO4	Integrate knowledge of communication technologies with appropriate policy, financial and management issues
CO5	Anticipate the way technological change and emerging technologies might alter the assumptions underlying
CO6	Apply current techniques, skills, and tools necessary for network management practice.

Subject- Project Management, Course Code- ILO8021

CO1	Gain project management foundation and various organizational structures knowledge
CO2	Apply selection criteria and select an appropriate project from different options
CO3	Write work break down structure for a project and develop a schedule based on it.
CO4	Identify opportunities and threats to the project and decide an approach to deal with them strategically
CO5	Use Earned value technique and determine & predict status of the project.
CO6	Capture lessons learned during project phases and document them for future reference.

Subject- Finance Management, Course Code- ILO8022

CO1	Explain the importance and components of the Indian Financial System
CO2	Estimate the risk & returns and present / future value of various investments
CO3	Describe corporate finance and significance of financial statements & ratio analysis
CO4	Calculate capital budgeting using various investment appraisal criterias & also the working capital requirements
CO5	Explain the various sources of finance and capital structure theories & approaches
CO6	Describe the dividend policy theories & approaches

Subject- Digital Business Management, Course Code- ILO8028

CO1	Identify environmental Issues relevant to India and Global concerns.
CO2	Understand and apply the concept of Environment Management and Sustainable development.
CO3	Relate to the scope of Environment Management and identify career opportunities.
CO4	Understand the concept of ecology, Ecosystem, its interdependence and food chain.
CO5	Demonstrate awareness of environment related legislations.
CO6	Develop awareness of EMS and ISO-14000.

Subject- Environmental Management, Course Code- ILO8029

CO1	Identify environmental Issues relevant to India and Global concerns.
CO2	Understand and apply the concept of Environment Management and Sustainable development.
CO3	Relate to the scope of Environment Management and identify career opportunities.
CO4	Understand the concept of ecology, Ecosystem, its interdependence and food chain.
CO5	Demonstrate awareness of environment related legislations.
CO6	Develop awareness of EMS and ISO-14000.

Subject - RF Design Lab, Course Code- ECL801

CO1	Demonstrate the working of a Spectrum Analyzer.
CO2	Design and perform experiment on Low Pass Filter, High Pass Filter, Band Pass Filter.
CO3	Design Passive Matching Networks for RF circuits.
CO4	Calculate Stability circle parameters for microwave amplifier.
CO5	Calculate Gain and Noise parameters for a microwave transistor amplifier design.
CO6	Differentiate various emission standards.

Subject- Wireless Networks Lab, Course Code- ECL802

CO1	Demonstrate knowledge of protocols used in wireless networks
CO2	Simulate mobile environment for wireless network
CO3	Implement various wireless networks
CO4	Demonstrate knowledge of programming for wireless network
CO5	Design simulations of wireless sensor network for IoT
CO6	Classify and compare different wireless networks

Subject- Satellite Communication Lab, Course Code- ECLDLO8043

CO1	Explain the difference between active and passive satellite link using different types of signals and measure baseband parameters.
CO2	Demonstrate the working of telemetry, tracking & command subsystem.
CO3	Analyze link budget of satellite signal for proper communication
CO4	Simulate and analyze the performance of satellite communication system
CO5	Compute look angles and limits of visibility of satellite.
CO6	Relate advanced satellite communication systems.

Subject- Network Management in Telecommunication Lab, Course Code- ECLDLO8044

CO1	Identify functional areas of management
CO2	Select adequate management platforms and tools
CO3	Apply current techniques, skills, and tools necessary for network management practice.
CO4	Apply network management tools and maintain the network by performing routine maintenance tasks.



Graduate School of
Technology

RISE WITH EDUCATION

CO5	Install, configure, diagnose, repair, implement, demonstrate, and evaluate a computer-based system
CO6	Apply concepts and architecture behind standards based network management associated with snmp.

Subject- Project-II, Course Code- ECL803

CO1	Simulate and implement their proposed design of the problem
CO2	Test and troubleshoot their model/prototype
CO3	Compare the proposed work with the one reported in the literature
CO4	Present their work through paper publication/presentation/project-exhibition/competition etc.
CO5	Cultivate the habit of working in team along with financial management
CO6	Prepare, organize the documents (thesis/black-book) by following ethics