Adi Shankara
INSTITUTE OF ENGINEERING AND TECHNOLOGY, KALADY
Approved by AICTE & Affiliated to APJ Abdul Kalam Technological University
Vidya Bharathi Nagar, Kalady, Ernakulam, Kerala
www.adishankara.ac.in

B.TECH ELECTRONICS & COMMUNICATION ENGINEERING

2019 Scheme Syllabus - Course Outcomes

S1S2 B.Tech (2019) Syllabus			
COURSE NAME	**COURSE CODE**	**COURSE OUTCOME CODE**	**COURSE OUTCOME STATEMENTS**
LINEAR ALGEBRA AND CALCULUS	**MAT 101**	**CO 1**	Solve systems of linear equations, diagonalize matrices and characterise quadratic forms.
		CO 2	Compute the partial and total derivatives and maxima and minima of multivariable functions.
		CO 3	Compute multiple integrals and apply them to find areas and volumes of geometrical shapes, mass and centre of gravity of plane laminas.
		CO 4	Perform various tests to determine whether a given series is convergent, absolutely convergent or conditionally convergent.
		CO 5	Determine the Taylor and Fourier series expansion of functions and learn their applications.
ENGINEERING PHYSICS A	**PHT 100**	**CO 1**	Compute the quantitative aspects of waves and oscillations in engineering systems.
		CO 2	Apply the interaction of light with matter through interference, diffraction and identify these phenomena in different natural optical processes and optical instruments.
		CO 3	Analyze the behaviour of matter in the atomic and subatomic level through the principles of quantum mechanics to perceive the microscopic processes in electronic devices.
		CO 4	Classify the properties of magnetic materials and apply vector calculus to static magnetic fields and use Maxwell's equations to diverse engineering problems.
		CO 5	Analyze the principles behind various superconducting applications, explain the working of solid state lighting devices and fiber optic communication system.
ENGINEERING	**CYT 100**	**CO 1**	Apply the basic concepts of electrochemistry and corrosion to explore its possible applications in various engineering fields.

CHEMISTRY		**CO 2**	Understand various spectroscopic techniques like UV-Visible, IR, NMR and its applications.
		CO 3	Apply the knowledge of analytical method for characterizing a chemical mixture or a compound. Understand the basic concept of SEM for surface characterisation of nanomaterials.
		CO 4	Learn about the basics of stereochemistry and its application. Apply the knowledge of conducting polymers and advanced polymers in engineering.
		CO 5	Study various types of water treatment methods to develop skills for treating wastewater.
ENGINEERING MECHANICS	**EST 100**	**CO 1**	Recall principles and theorems related to rigid body mechanics.
		CO 2	Identify and describe the components of system of forces acting on the rigid body.
		CO 3	Apply the conditions of equilibrium to various practical problems involving different force system.
		CO 4	Choose appropriate theorems, principles or formulae to solve problems of mechanics.
		CO 5	Solve problems involving rigid bodies, applying the properties of distributed areas and masses.
ENGINEERING GRAPHICS	**EST 110**	**CO 1**	Draw the projection of points and lines located in different quadrants.
		CO 2	Prepare multiview orthographic projections of objects by visualizing them in different positions.
		CO 3	Draw sectional views and develop surfaces of a given object.
		CO 4	Prepare pictorial drawings using the principles of isometric and perspective projections to visualize objects in three dimensions.
		CO 5	Convert 3D views to orthographic views.
		CO 6	Obtain multiview projections and solid models of objects using CAD tools.
BASICS OF CIVIL & MECHANICAL ENGINEERING	**EST 120**	**CO 1**	Recall the role of civil engineer in society and to relate the various disciplines of Civil Engineering.
		CO 2	Explain different types of buildings, building components, building materials and building construction.
		CO 3	Describe the importance, objectives and principles of surveying.
		CO 4	Summarise the basic infrastructure services MEP, HVAC, elevators, escalators and ramps.
		CO 5	Discuss the Materials, energy systems, water management and environment for green buildings.
		CO 6	Analyse thermodynamic cycles and calculate its efficiency.
		CO 7	Illustrate the working and features of IC Engines.
		CO 8	Explain the basic principles of Refrigeration and Air Conditioning.
		CO 9	Describe the working of hydraulic machines.
		CO 10	Explain the working of power transmission elements.

		CO 11	Describe the basic manufacturing, metal joining and machining processes.
BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING	**EST 130**	**CO 1**	Apply fundamental concepts and circuit laws to solve simple DC electric circuits.
		CO 2	Develop and solve models of magnetic circuits.
		CO 3	Apply the fundamental laws of electrical engineering to solve simple ac circuits in steady state.
		CO 4	Describe working of a voltage amplifier.
		CO 5	Outline the principle of an electronic instrumentation system.
		CO 6	Explain the principle of radio and cellular communication.
LIFE SKILLS	**HUN 101**	**CO 1**	Define and identify different life skills required in personal and professional life.
		CO 2	Develop an awareness of the self and apply well-defined techniques to cope with emotions and stress.
		CO 3	Explain the basic mechanics of effective communication and demonstrate these through presentations.
		CO 4	Take part in group discussions.
		CO 5	Use appropriate thinking and problem solving techniques to solve new problems.
		CO 6	Understand the basics of teamwork and leadership.
ENGINEERING PHYSICS LAB	**PHL 120**	**CO 1**	Develop analytical/experimental skills and impart prerequisite hands on experience for engineering laboratories.
		CO 2	Understand the need for precise measurement practices for data recording.
		CO 3	Understand the principle, concept, working and applications of relevant technologies and comparison of results with theoretical calculations.
		CO 4	Analyze the techniques and skills associated with modern scientific tools such as lasers and fiber optics.
		CO 5	Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results.
ENGINEERING CHEMISTRY LAB	**CYL 120**	**CO 1**	Understand and practice different techniques of quantitative chemical analysis to generate experimental skills and apply these skills to various analyses.
		CO 2	Develop skills relevant to synthesize organic polymers and acquire the practical skill to use TLC for the identification of drugs.
		CO 3	Develop the ability to understand and explain the use of modern spectroscopic techniques for analysing and interpreting the IR spectra and NMR spectra of some organic compounds.
		CO 4	Acquire the ability to understand, explain and use instrumental techniques for chemical analysis.
		CO 5	Learn to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments.

		CO 6	Function as a member of a team, communicate effectively and engage in further learning. Also understand how chemistry addresses social, economical and environmental problems and why it is an integral part of curriculum.
CIVIL & MECHANICAL WORKSHOP	**ESL 120**	**CO 1**	Name different devices and tools used for civil engineering measurements.
		CO 2	Explain the use of various tools and devices for various field measurements.
		CO 3	Demonstrate the steps involved in basic civil engineering activities like plot measurement, setting out operation, evaluating the natural profile of land, plumbing and undertaking simple construction work.
		CO 4	Choose materials and methods required for basic civil engineering activities like field measurements, masonry work and plumbing.
		CO 5	Compare different techniques and devices used in civil engineering measurements.
		CO 6	Identify Basic Mechanical workshop operations in accordance with the material and objects.
		CO 7	Apply appropriate Tools and Instruments with respect to the mechanical workshop trades.
		CO 8	Apply appropriate safety measures with respect to the mechanical workshop trades.
ELECTRICAL & ELECTRONICS WORKSHOP	**ESL 130**	**CO 1**	Demonstrate safety measures against electric shocks.
		CO 2	Identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols.
		CO 3	Develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings.
		CO 4	Identify and test various electronic components.
		CO 5	Draw circuit schematics with EDA tools.
		CO 6	Assemble and test electronic circuits on boards.
		CO 7	Work in a team with good interpersonal skills.
VECTOR CALCULUS, DIFFERENTIAL EQUATIONS AND TRANSFORMS	**MAT 102**	**CO 1**	Compute the derivatives and line integrals of vector functions and learn their applications.
		CO 2	Evaluate surface and volume integrals and learn their inter-relations and applications.
		CO 3	Solve homogeneous and non-homogeneous linear differential equation with constant coefficients.
		CO 4	Compute Laplace transform and apply them to solve ODEs arising in engineering.
		CO 5	Determine the Fourier transforms of functions and apply them to solve problems arising in engineering.
PROFESSIO	**HUN**	**CO 1**	Develop vocabulary and language skills relevant to engineering as a profession.

NAL COMMUNICATION	**102**	**CO 2**	Analyze, interpret and effectively summarize a variety of textual content.
		CO 3	Create effective technical presentations.
		CO 4	Discuss a given technical/non-technical topic in a group setting and arrive at generalizations/consensus.
		CO 5	Identify drawbacks in listening patterns and apply listening techniques for specific needs.
		CO 6	Create professional and technical documents that are clear and adhering to all the necessary conventions.
PROGRAMING IN C	**EST 102**	**CO 1**	Analyze a computational problem and develop an algorithm/flowchart to find its solution.
		CO 2	Develop readable* C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators.
		CO 3	Write readable C programs with arrays, structure or union for storing the data to be processed.
		CO 4	Divide a given computational problem into a number of modules and develop a readable multi-function C program by using recursion if required, to find the solution to the computational problem.
		CO 5	Write readable C programs which use pointers for array processing and parameter passing.
		CO 6	Develop readable C programs with files for reading input and storing output.

S3 S4 B.Tech (2019) Syllabus

COURSE NAME	COURSE CODE	COURSE OUTCOME CODE	COURSE OUTCOME STATEMENTS
PARTIAL DIFFERENTIAL EQUATIONS AND COMPLEX ANALYSIS	MAT 201	CO 1	Understand the concept and the solution of partial differential equation.
		CO 2	Analyse and solve one dimensional wave equation and heat equation.
		CO 3	Understand complex functions, its continuity differentiability with the use of CauchyRiemann equations.
		CO 4	Evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula, understand the series expansion of analytic function.
		CO 5	Understand the series expansion of complex function about a singularity and Apply residue theorem to compute several kinds of real integrals.
SOLID STATE DEVICES	ECT 201	CO 1	Apply Fermi-Dirac Distribution function and Compute carrier concentration at equilibrium and the parameters associated with generation, recombination and transport mechanism.
		CO 2	Explain drift and diffusion currents in extrinsic semiconductors and compute current density due to these effects.
		CO 3	Define the current components and derive the current equation in a pn junction diode and bipolar junction transistor.
		CO 4	Explain the basic MOS physics and derive the expressions for drain current in linear and saturation regions.
		CO 5	Discuss scaling of MOSFETs and short channel effects.
LOGIC CIRCUIT DESIGN	ECT 203	CO 1	Explain the elements of digital system abstractions such as digital representations of information, digital logic and Boolean algebra.
		CO 2	Create an implementation of a combinational logic function described by a truth table using and/or/inv gates/ muxes.
		CO 3	Compare different types of logic families with respect to performance and efficiency.
		CO 4	Design a sequential logic circuit using the basic building blocks like flip-flops.

		CO 5	Design and analyze combinational and sequential logic circuits through gate level Verilog models.
NETWORK THEORY	**ECT205**	**CO 1**	Apply Mesh / Node analysis or Network Theorems to obtain steady state response of the linear time invariant networks.
		CO 2	Apply Laplace Transforms to determine the transient behaviour of RLC networks.
		CO 3	Apply Network functions and Network Parameters to analyse the single port and two port networks.
DESIGN AND ENGINEERING	**EST 200**	**CO 1**	Explain the different concepts and principles involved in design engineering.
		CO 2	Apply design thinking while learning and practicing engineering.
		CO 3	Develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering.
SUSTAINABLE ENGINEERING	**MCN 201**	**CO 1**	Understand the relevance and the concept of sustainability and the global initiatives in this direction.
		CO 2	Explain the different types of environmental pollution problems and their sustainable solutions.
		CO 3	Discuss the environmental regulations and standards.
		CO 4	Outline the concepts related to conventional and non-conventional energy.
		CO 5	Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles.
SCIENTIFIC COMPUTING LABORATORY	**ECL 201**	**CO 1**	Describe the needs and requirements of scientific computing and to familiarize one programming language for scientific computing and data visualization.
		CO 2	Approximate an array/matrix with matrix decomposition.
		CO 3	Implement numerical integration and differentiation.
		CO 4	Solve ordinary differential equations for engineering applications.
		CO 5	Compute with exported data from instruments.
		CO 6	Realize how periodic functions are constituted by sinusoids.
		CO7	Simulate random processes and understand their statistics.
LOGIC DESIGN LAB	**ECL 203**	**CO 1**	Design and demonstrate the functioning of various combinational and sequential circuits using ICs.
		CO 2	Apply an industry compatible hardware description language to implement digital circuits.
		CO 3	Implement digital circuis on FPGA boards and connect external hardware to the boards.
		CO 4	Function effectively as an individual and in a team to accomplish the given task.
PROBABILITY, RANDOM PROCESS AND	**MAT 204**	**CO 1**	Understand the concept, properties and important models of discrete random variables and, using them, analyse suitable random phenomena.
		CO 2	Understand the concept, properties and important models of continuous random variables and, using them, analyse suitable random phenomena.

NUMERICAL METHODS		**CO 3**	Analyse random processes using autocorrelation, power spectrum and Poisson process model as appropriate.
		CO 4	Compute roots of equations, evaluate definite integrals and perform interpolation on given numerical data using standard numerical techniques.
		CO 5	Apply standard numerical techniques for solving systems of equations, fitting curves on given numerical data and solving ordinary differential equations.
ANALOG CIRCUITS	**ECT 202**	**CO 1**	Design analog signal processing circuits using diodes and first order RC circuit.
		CO 2	Analyse basic amplifiers using BJT and MOSFET.
		CO 3	Apply the principle of oscillator and regulated power supply circuits.
SIGNALS AND SYSTEMS	**ECT 204**	**CO 1**	Apply properties of signals and systems to classify them.
		CO 2	Represent signals with the help of series and transforms.
		CO 3	Describe orthogonality of signals and convolution integral.
		CO 4	Apply transfer function to compute the LTI response to input signals.
		CO 5	Apply sampling theorem to discretize continuous time signals.
COMPUTER ARCHITECTURE AND MICROCONTROLLERS	**ECT 206**	**CO 1**	Explain the functional units, I/O and memory management w.r.t a typical computer architecture.
		CO 2	Distinguish between microprocessor and microcontroller.
		CO 3	Develop simple programs using assembly language programming.
		CO 4	Interface 8051 microcontroller with peripheral devices using ALP/Embedded C.
		CO 5	Familiarize system software and Advanced RISC Machine Architecture.
PROFESSIONAL ETHICS	**HUT 200**	**CO 1**	Understand the core values that shape the ethical behaviour of a professional.
		CO 2	Adopt a good character and follow an ethical life.
		CO 3	Explain the role and responsibility in technological development by keeping personal ethics and legal ethics.
		CO 4	Solve moral and ethical problems through exploration and assessment by established experiments.
		CO 5	Apply the knowledge of human values and social values to contemporary ethical values and global issues.
CONSTITUTION OF INDIA	**MCN 202**	**CO 1**	Explain the background of the present constitution of India and features.
		CO 2	Utilize the fundamental rights and duties.
		CO 3	Understand the working of the union executive, parliament and judiciary.
		CO 4	Understand the working of the state executive, legislature and judiciary.
		CO 5	Utilize the special provisions and statutory institutions.
		CO 6	Show national and patriotic spirit as responsible citizens of the country.

ANALOG CIRCUITS AND SIMULATION LAB	**ECL 202**	**CO 1**	Design and demonstrate the functioning of basic analog circuits using discrete components.
		CO 2	Design and simulate the functioning of basic analog circuits using simulation tools.
		CO 3	Function effectively as an individual and in a team to accomplish the given task.
MICROCONTROLLER LAB	**ECL 204**	**CO 1**	Write an Assembly language program/Embedded C program for performing data manipulation.
		CO 2	Develop ALP/Embedded C Programs to interface microcontroller with peripherals.
		CO 3	Perform programming/interfacing experiments with IDE for modern microcontrollers.

S5 S6 B.Tech (2019) Syllabus

COURSE NAME	COURSE CODE	COURSE OUTCOME CODE	COURSE OUTCOME STATEMENTS
LINEAR INTEGRATED CIRCUITS	ECT 301	CO 1	Understand Op Amp fundamentals and differential amplifier configurations.
		CO 2	Design operational amplifier circuits for various applications.
		CO 3	Design Oscillators and active filters using Op amps.
		CO 4	Explain the working and applications of timer, VCO and PLL ICs.
		CO 5	Outline the working of Voltage regulator IC's and Data converters.
DIGITAL SIGNAL PROCESSING	ECT 303	CO 1	State and prove the fundamental properties and relations relevant to DFT and solve basic problems involving DFT based filtering methods.
		CO 2	Compute DFT and IDFT using DIT and DIF radix-2 FFT algorithms
		CO 3	Design linear phase FIR filters and IIR filters for a given specification.
		CO 4	Illustrate the various FIR and IIR filter structures for the realization of the given system function.
		CO 5	Explain the basic multi-rate DSP operations decimation and interpolation in both time and frequency domains using supported mathematical equations.
		CO 6	Explain the architecture of DSP processor (TMS320C67xx) and the finite word length effects.
ANALOG AND DIGITAL COMMUNICATION	ECT 305	CO 1	Explain the existent analog communication systems.
		CO 2	Apply the concepts of random processes to LTI systems.
		CO 3	Apply waveform coding techniques in digital transmission.
		CO4	Apply GS procedure to develop digital receivers.
		CO5	Apply equalizer design to counteract ISI.
		C06	Apply digital modulation techniques in signal transmission.
CONTROL SYSTEMS	ECT 307	CO 1	Analyse electromechanical systems by mathematical modelling and derive their transfer functions.
		CO 2	Determine Transient and Steady State behaviour of systems using standard test signals.
		CO 3	Determine absolute stability and relative stability of a system.

		CO 4	Apply frequency domain techniques to assess the system performance and to design a control system with suitable compensation techniques.
		CO 5	Analyse system Controllability and Observability using state space representation.
INDUSTRIAL ECONOMICS AND FOREIGN TRADE	**HUT 300**	**CO 1**	Explain the problem of scarcity of resources and consumer behaviour, and to evaluate the impact of government policies on the general economic welfare.
		CO 2	Take appropriate decisions regarding volume of output and to evaluate the social cost of production.
		CO 3	Determine the functional requirement of a firm under various competitive conditions.
		CO 4	Examine the overall performance of the economy, and the regulation of economic fluctuations and its impact on various sections in the society.
		CO 5	Determine the impact of changes in global economic policies on the business opportunities of a firm.
DISASTER MANAGEMENT	**MCN 301**	**CO 1**	Define and use various terminologies in use in disaster management parlance and organise each of these terms in relation to the disaster management cycle.
		CO 2	Distinguish between different hazard types and vulnerability types and do vulnerability assessment.
		CO 3	Identify the components and describe the process of risk assessment, and apply appropriate methodologies to assess risk.
		CO 4	Explain the core elements and phases of Disaster Risk Management and develop possible measures to reduce disaster risks across sector and community.
		CO 5	Identify factors that determine the nature of disaster response and discuss the various disaster response actions.
		CO 6	Explain the various legislations and best practices for disaster management and risk reduction at national and international level.
ANALOG INTEGRATED CIRCUITS AND SIMULATION LAB	**ECL 331**	**CO 1**	Use data sheets of basic Analog Integrated Circuits and design and implement application circuits using Analog Ics.
		CO 2	Design and simulate the application circuits with Analog Integrated Circuits using simulation tools.
		CO 3	Function effectively as an individual and in a team to accomplish the given task.
DIGITAL SIGNAL PROCESSING LAB	**ECL 333**	**CO 1**	Simulate digital signals.
		CO 2	verify the properties of DFT computationally.
		CO 3	Familiarize the DSP hardware and interface with computer.
		CO 4	Implement LTI systems with linear convolution.
		CO 5	Implement FFT and IFFT and use it on real time signals.
		CO6	Implement FIR low pass filter.

		CO7	Implement real time LTI systems with block convolution and FFT.
ELECTRO MAGNETIC S	**ECT 302**	**CO 1**	To summarize the basic mathematical concepts related to electromagnetic vector fields.
		CO 2	Analyse Maxwell's equation in different forms and apply them to diverse engineering problems.
		CO 3	To analyse electromagnetic wave propagation and wave polarization.
		CO 4	To analyse the characteristics of transmission lines and solve the transmission line problems using Smith chart.
		CO 5	To analyse and evaluate the propagation of EM waves in Wave guides.
VLSI CIRCUIT DESIGN	**ECT 304**	**CO 1**	Explain the various methodologies in ASIC and FPGA design.
		CO 2	Design VLSI Logic circuits with various MOSFET logic families.
		CO 3	Compare different types of memory elements.
		CO4	Design and analyse data path elements such as Adders and multipliers.
		CO5	Explain MOSFET fabrication techniques and layout design rules.
INFORMAT ION THEORY AND CODING	**ECT 306**	**CO 1**	Explain measures of information – entropy, conditional entropy, mutual information.
		CO 2	Apply Shannon's source coding theorem for data compression.
		CO 3	Apply the concept of channel capacity for characterize limits of error-free transmission.
		CO4	Apply linear block codes for error detection and correction.
		CO5	Apply algebraic codes with reduced structural complexity for error correction.
		CO6	Understand encoding and decoding of covolutional and LDPC codes.
EMBEDDE D SYSTEMS (ELECTIVE - I)	**ECT 342**	**CO 1**	Understand and gain the basic idea about the embedded system.
		CO 2	Able to gain architectural level knowledge about the system and hence to program an embedded system.
		CO 3	Apply the knowledge for solving the real life problems with the help of an embedded system.
DIGITAL IMAGE PROCESSI NG (ELECTIVE - I)	**ECT 352**	**CO 1**	Distinguish / Analyse the various concepts and mathematical transforms necessary for image processing.
		CO 2	Differentiate and interpret the various image enhancement techniques.
		CO 3	Illustrate image segmentation algorithm.
		CO4	Understand the basic image compression techniques.
INTRODUC TION TO MEMS (ELECTIVE - I)	**ECT 362**	**CO 1**	Describe the working principles of micro sensors and actuators.
		CO 2	Identify commonly used mechanical structures in MEMS.
		CO 3	Explain the application of scaling laws in the design of micro systems.
		CO4	Identify the typical materials used for fabrication of micro systems.
		CO5	Explain the principles of standard micro fabrication techniques.

		CO 6	Describe the challenges in the design and fabrication of Micro systems.
MANAGEMENT FOR ENGINEERS	**HUT 310**	**CO 1**	Explain the characteristics of management in the contemporary context.
		CO 2	Describe the functions of management.
		CO 3	Demonstrate ability in decision making process and productivity analysis.
		CO4	Illustrate project management technique and develop a project schedule.
		CO5	Summarize the functional areas of management.
		CO 6	Comprehend the concept of entrepreneurship and create business plans.
COMPREHENSIVE COURSE WORK	**ECT 308**	**CO 1**	Apply the knowledge of circuit theorems and solid state physics to solve the problems in electronic Circuits.
		CO 2	Design a logic circuit for a specific application.
		CO 3	Design linear IC circuits for linear and non-linear circuit applications.
		CO4	Explain basic signal processing operations and Filter designs.
		CO5	Explain existent analog and digital communication systems.
COMMUNICATION LAB	**ECL 332**	**CO1**	Setup simple prototype circuits for waveform coding and digial modulation techniques working in a team.
		CO2	Simulate the error performance of a digital communication system using standard binary and M -ary modulation schemes.
		CO3	Develop hands-on skills to emulate a communication system with software-designed-radio working in a team.
MINIPROJECT	**ECD 334**	**CO1**	Be able to practice acquired knowledge within the selected area of technology for project development.
		CO2	Identify, discuss and justify the technical aspects and design aspects of the project with a systematic approach.
		CO3	Reproduce, improve and refine technical aspects for engineering projects.
		CO4	Work as a team in development of technical projects.
		CO5	Communicate and report effectively project related activities and findings.

S7 S8 B.Tech (2019) Syllabus			
COURSE NAME	**COURSE CODE**	**COURSE OUTCOME CODE**	**COURSE OUTCOME STATEMENTS**
MICROWAVES AND ANTENNAS	**ECT 401**	**CO 1**	Understand the basic concept of antennas and its parameters.
		CO 2	Analyze the far filed pattern of short dipole and Half wave dipole antenna.
		CO 3	Design of various broad band antennas, arrays and its radiation patterns.
		CO 4	Illustrate the principle of operation of cavity resonators and various microwave sources.
		CO 5	Explain various microwave hybrid circuits and microwave semiconductor devices.
OPTICAL FIBER COMMUNICATION (ELECTIVE – II)	**ECT 413**	**CO 1**	Understand the working and classification of optical fibers in terms of propagation modes
		CO 2	Solve problems of transmission characteristics and losses in optical fiber
		CO 3	Explain the constructional features and the characteristics of optical sources and detectors
		CO 4	Describe the operations of optical amplifiers
		CO 5	Understand the concept of WDM, FSO and LiFi
MACHINE LEARNING (ELECTIVE – II)	**ECT 463**	**CO 1**	Understand the basics of machine learning and different types
		CO 2	Differentiate regression and classification, apply Bayes' decision theory in classification
		CO 3	Apply linear algebra and statistical methods in discriminant based algorithms
		CO 4	Understand the basics of unsupervised learning and non-metric methods
		CO 5	Understand ensemble methods, dimensionality reduction, evaluation, model selection.
INDUSTRIAL SAFETY ENGINEERING	**MCN 401**	**CO 1**	Describe the theories of accident causation and preventive measures of industrial accidents.
		CO 2	Explain about personal protective equipment, its selection, safety performance & indicators and importance of housekeeping.

		CO 3	Explain different issues in construction industries.
		CO 4	Describe various hazards associated with different machines and mechanical material handling.
		CO 5	Utilise different hazard identification tools in different industries with the knowledge of different types of chemical hazards.
ELECTROMAGNETICS LAB	**ECL 411**	**CO 1**	Familiarize the basic Microwave components and to analyse few microwave measurements and its parameters.
		CO 2	Understand the principles of fiber-optic communications and the different kind of losses, signal distortion and other signal degradation factors.
		CO 3	Design and simulate basic antenna experiments with simulation tools.
SEMINAR	**ECQ 413**	**CO 1**	Identify academic documents from the literature which are related to her/his areas of interest.
		CO 2	Read and apprehend an academic document from the literature which is related to her/ his areas of interest.
		CO 3	Prepare a presentation about an academic document.
		CO4	Give a presentation about an academic document.
		CO5	Prepare a technical report.
PROJECT PHASE I	**ECD 415**	**CO1**	Model and solve real world problems by applying knowledge across domains.
		CO2	Develop products, processes or technologies for sustainable and socially relevant applications.
		CO3	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks.
		CO4	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms.
		CO5	Identify technology/research gaps and propose innovative/creative solutions.
		CO6	Organize and communicate technical and scientific findings effectively in written and oral forms.
WIRELESS COMMUNICATION	**ECT 402**	**CO1**	Summarize the basics of cellular system and cellular design fundamentals.
		CO2	Describe the wireless channel models and discuss capacity of wireless channels.
		CO3	Analyze the performance of the modulation techniques for flat-fading channels and multicarrier modulation.
		CO4	Illustrate how receiver performance can be enhanced by various diversity techniques.
		CO5	Identify advantages of various equalization techniques and multiple-access techniques in wireless communication.
		CO6	Calculate system parameters such antenna height, range, maximum usable frequency in different modes of radio wave propagation.

SATELLITE COMMUNICATION (ELECTIVE - III)	**ECT 424**	**CO1**	Define satellite communications& possible satellite orbits.
		CO2	Describe satellite communication subsystems& launching mechanisms of satellites.
		CO3	Calculate link budgets. Provide an in-depth treatment of satellite communication systems operation and planning.
		CO4	Analyze the various methods of satellite access.
		CO5	Discuss various applications of satellite communications.
ENTREPRENEURSHIP (ELECTIVE - III)	**ECT 474**	**CO1**	Discuss the fundamental concepts of entrepreneurship.
		CO2	Understand entrepreneurial motivation and motivation theories.
		CO3	Analyze types of enterprises and ownership structure.
		CO4	Apply project evaluation methods.
		CO5	Evaluate enterprise financial strength.
REAL TIME OPERATING SYSTEM (ELECTIVE - IV)	**ECT 426**	**CO1**	Summarize the functions and structure of general-purpose operating systems.
		CO2	Use different scheduling algorithms on processes and threads.
		CO3	Interpret a real time operating system along with its synchronization, communication and interrupt handling tools.
		CO4	Illustrate task constraints and analyze the different scheduling algorithms on tasks.
		CO5	Illustrate the applications of real time operating systems.
RENEWABLE ENERGY SYSTEMS (ELECTIVE - V)	**ECT 468**	**CO1**	Understand the need, importance and scope of various non-conventional sources of energy.
		CO2	Outline the concepts and technologies related to renewable energy systems using wind and Solar-PV.
		CO3	Understand the integration of smart grid with renewable energy systems.
		CO4	Explain the concept of distribution management system.
		CO5	Describe the fundamentals of Smart metering.
PROJECT PHASE II	**ECD 416**	**CO1**	Model and solve real world problems by applying knowledge across domains.
		CO2	Develop products, processes or technologies for sustainable and socially relevant applications.
		CO3	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks.
		CO4	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms.
		CO5	Identify technology/research gaps and propose innovative/creative solutions.
		CO6	Organize and communicate technical and scientific findings effectively in written and oral forms.