CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)
DEPARTMENT OF ECE

BE - ELECTRONICS AND COMMUNICATION ENGINEERING

PROGRAM OUTCOMES

PO1	Engineering Knowledge	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.
PO2	Problem analysis	Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/Development of Solutions	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.
PO4	Conduct Investigations of Complex Problems	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern Tool Usage	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling to complex engineering activities, with an understanding of the limitations.
PO6	The Engineer and Society	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and Sustainability	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and Teamwork	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication	Communicate effectively on complex engineering activities with the engineering community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project Management and Finance	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12	Life-long Learning	Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

R22: DEPARTMENT OF ECE

VISION OF THE DEPARTMENT

To emerge as a vibrant model of excellence in education, research and innovation in Electronics and Communication Engineering.

MISSION OF THE DEPARTMENT

M1	To impart strong theoretical and practical knowledge of the state of art technologies to meet growing challenges in the industry.
M2	To carry out the advanced and need based research in consultation with the renowned research and industrial organizations.
M3	To create entrepreneurship environment including innovation, incubation and encourage to patent the work.

PROGRAM EDUCATIONAL OBJECTIVES

The PEOs are to facilitate the graduating students to:

PEO1	Engage successfully in professional career and/or pursue higher education in Electronics and Communication and allied areas.
PEO2	Pursue research, design and development of state-of-the art systems applying the knowledge of Electronics and Communication engineering.
PEO3	Begin start-ups and involve in entrepreneurship activities by adopting changing professional and societal needs.
PEO4	Exhibit professional ethics and values with lifelong learning and work effectively as individuals/team members in multidisciplinary projects.

PROGRAM SPECIFIC OUTCOMES

The Graduates of this program will:

PSO1	Ability to apply the acquired knowledge of core subjects in design and development of Communications/Signal processing/ VLSI/ Embedded systems.
PSO2	Analyze and solve the complex Electronics and Communication engineering problems using state-of-art hardware and software tools.
PSO3	Develop innovative technologies for Entrepreneurship based on the research outcomes of Electronics and Communication engineering.

COURSE OUTCOMES

S.No	Year / Sem	Name of the course	
1	I / I	**22MTC02 - CALCULUS**	
		22MTC02.1	Apply the Matrix Methods to solve system of linear equations.
		22MTC02.2	Analyze the geometrical interpretation of Mean value theorems and curvature.
		22MTC02.3	Determine the extreme values of functions of two variables.
		22MTC02.4	Find the shape of the curve, surface areas and volumes of revolution
		22MTC02.5	Examine the convergence and divergence of infinite Series.
2	I / I	**22CYC01 - CHEMISTRY**	
		22CYC01.1	Identify the microscopic chemistry in terms of molecular orbitals, intermolecular forces and rate of chemical reactions.
		22CYC01.2	Discuss the properties and processes using thermodynamic functions, electrochemical cells and their role in batteries and fuel cells.
		22CYC01.3	Illustrate the major chemical reactions that are used in the synthesis of organic molecules.
		22CYC01.4	Classify the various methods used in treatment of water for domestic and industrial use.
		22CYC01.5	Outline the synthesis of various Engineering materials & Drugs.
3	I / I	**22EEC01 - BASIC ELECTRICAL ENGINEERING**	
		22EEC01.1	Understand the concepts of Kirchhoff's laws and their application various theorems to get solution of simple dc circuits.
		22EEC01.2	Predict the steady state response of RLC circuits with AC single phase/three phase supply.
		22EEC01.3	Infer the basics of single phase transformer.
		22EEC01.4	Describe the construction, working principle of DC machine and 3-phase Induction motor.
		22EEC01.5	Acquire the knowledge of electrical wires, cables, earthing, Electrical safety precautions to be followed in electrical installations and electric shock and its safety and energy calculations.
		22CSC01 - PROBLEM SOLVING AND PROGRAMMING	
		22CSC01.1	Understand real world problems and develop computer solutions for those problems.

4	I / I	22CSC01.2	Understand the basics of Python.
		22CSC01.3	Apply Python for solving basic programming solutions.
		22CSC01.4	Create algorithms/flowcharts for solving real-time problems.
		22CSC01.5	Build and manage dictionaries to manage data.
		22CSC01.6	Handle data using files.
5	I / I	**22CYC02 - CHEMISTRY LAB**	
		22CYC02.1	Identify the basic chemical methods to analyze the substances quantitatively & qualitatively.
		22CYC02.2	Estimate the amount of chemical substances by volumetric analysis.
		22CYC02.3	Determine the rate constants of reactions from concentration of reactants/ products as a function of time.
		22CYC02.4	Calculate the concentration and amount of various substances using instrumental techniques.
		22CYC02.5	Develop the basic drug molecules and polymeric compounds.
6	I / I	**22MBC02 - COMMUNITY ENGAGEMENT**	
		22MBC02.1	Gain an understanding of Rural life, Culture and Social realities.
		22MBC02.2	Develop a sense of empathy and bonds of mutuality with Local Communities.
		22MBC02.3	Appreciate significant contributions of Local communities to Indian Society and Economy.
		22MBC02.4	Exhibit the knowledge of Rural Institutions and contributing to Community's Socio-Economic improvements.
		22MBC02.5	Utilize the opportunities provided by Rural Development Programmes.
7	I / I	**22CSC02 - PROBLEM SOLVING AND PROGRAMMING LAB**	
		22CSC02.1	Understand various Python program development Environments
		22CSC02.2	Demonstrate the concepts of Python.
		22CSC02.3	Implement algorithms/flowcharts using Python to solve real-world problems.
		22CSC02.4	Build and manage dictionaries to manage data.
		22CSC02.5	Write Python functions to facilitate code reuse.
		22CSC02.6	Use Python to handle files and memory.
		22MEC37 - ROBOTICS AND DRONES LAB	
		22MEC37.1	Demonstrate knowledge of the relationship between mechanical structures of robotics and their operational workspace characteristics

8	I / I	22MEC37.2	Understand mechanical components, motors, sensors and electronic circuits of robots and build robots.
		22MEC37.3	Demonstrate knowledge of robot controllers.
		22MEC37.4	Use Linux environment for robotic programming.
		22MEC37.5	Write Python scripts to control robots using Python and Open CV.
9	I / I	**22EEC02 - BASIC ELECTRICAL ENGINEERING LAB**	
		22EEC02.1	Comprehend the circuit analysis techniques using various circuital laws and theorems.
		22EEC02.2	Analyze the parameters of the given coil and measurement of power and energy in AC circuits.
		22EEC02.3	Determine the turns ration/performance parameters of single-phase transformer.
		22EEC02.4	Infer the characteristics of DC shunt motor different tests.
		22EEC02.5	Illustrate different parts and their function of electrical components, equipment and machines.
10	I / II	**22MTC05 - VECTOR CALCULUS AND DIFFERENTIAL EQUATIONS**	
		22MTC05.1	Apply the vector differential operators to Scalars and Vector functions.
		22MTC05.2	Solve line, surface & volume integrals by Greens, Gauss and Stoke's theorems.
		22MTC05.3	Calculate the solutions of first order linear differential equations.
		22MTC05.4	Solve higher order linear differential equations.
		22MTC05.5	Find solution of algebraic, transcendental and ODE by Numerical Methods.
11	I / II	**22PYC06 - ELECTROMAGNETIC THEORY AND QUANTUM MECHANICS**	
		22PYC06.1	Interpret the wave nature of the light.
		22PYC06.2	Extend the laws of electric and magnetic fields for wireless communication.
		22PYC06.3	Explain the principles of lasers and fiber optic communication.
		22PYC06.4	Find the applications of quantum mechanics.
		22PYC06.5	Identify semiconductors for engineering applications.
		22CEC01 - ENGINEERING MECHANICS	
		22CEC01.1	Calculate the components and resultant of coplanar forces system and Draw free body diagrams to analyze the forces in the given structure.
		22CEC01.2	Understand the mechanism of friction and can solve friction problems.

12	I / II	22CEC01.3	Analyse simple trusses for forces in various members of a truss.
		22CEC01.4	Determine the centroid of plane areas, composite areas and centres of gravity of bodies.
		22CEC01.5	Determine moments of inertia, product of inertia of plane and composite areas and mass moments of inertia of elementary bodies.
13	I / II	**22EGC01 - ENGLISH**	
		22EGC01.1	Illustrate the nature, process and types of communication and communicate effectively without barriers.
		22EGC01.2	Construct and compose coherent paragraphs, emails and adhering to appropriate mobile etiquette.
		22EGC01.3	Apply techniques of precision to write a précis and formal letters by using acceptable grammar and appropriate vocabulary.
		22EGC01.4	Distinguish formal from informal reports and demonstrate advanced writing skills by drafting formal reports.
		22EGC01.5	Critique passages by applying effective reading techniques
14	I / II	**22PYC09 - ELECTROMAGNETIC THEORY AND QUANTUM MECHANICS LAB**	
		22PYC09.1	Experiment with the concept of errors and find the ways to minimize the errors.
		22PYC09.2	Demonstrate properties of light experimentally.
		22PYC09.3	Find the applications of lasers and optical fibers in engineering applications.
		22PYC09.4	Make use of semiconductor devices for practical applications.
		22PYC09.5	Illustrate the working of optoelectronic devices.
15	I / II	**22EGC02 - ENGLISH LAB**	
		22EGC02.1	Define the speech sounds in English and understand the nuances of pronunciation in English
		22EGC02.2	Apply stress correctly and speak with the proper tone, intonation and rhythm.
		22EGC02.3	Analyze listening comprehension texts to enhance their listening skills.
		22EGC02.4	Determine the context and speak appropriately in various situations.
		22EGC02.5	Design and present effective posters while working in teams and discuss and participate in Group discussions.

16	I / II	**22MEC01 - CAD AND DRAFTING**	
		22MEC01.1	Become conversant with appropriate use of CAD software for drafting.
		22MEC01.2	Recognize BIS, ISO Standards and conventions in Engineering Drafting.
		22MEC01.3	Construct the projections of points, lines, planes, solids.
		22MEC01.4	Analyze the internal details of solids through sectional views.
		22MEC01.5	Create an isometric projections and views.
17	I / II	**22MEC38 - DIGITAL FABRICATION LAB**	
		22MEC38.1	Understand safety measures to be followed in workshop to avoid accidents.
		22MEC38.2	Identify various tools used in fitting, carpentry, tin smithy, house wiring, welding, casting and machining processes.
		22MEC38.3	Make a given model by using workshop trades including fitting, carpentry, tin smithy and House wiring.
		22MEC38.4	Perform various operations in welding, machining and casting processes.
		22MEC38.5	Conceptualize and produce simple device/mechanism of their choice.
18	II / I	**22MTC08 - TRANSFORM THEORY AND COMPLEX ANALYSIS**	
		22MTC08.1	Find Laplace, Inverse Laplace and solution of engineering problems.
		22MTC08.2	Find the solution of Difference Equation.
		22MTC08.3	Understand the methods to find solution of linear and non-linear PDE and solution of wave equation.
		22MTC08.4	Solve the problems on analytic functions, Cauchy's theorem and Cauchy's integral formula.
		22MTC08.5	Complex integrals by using Cauchy's Residues theorem.
19	II / I	**22CSC29 - C AND DATA STRUCTURES**	
		22CSC29.1	Analyze the basic concepts of C Programming language.
		22CSC29.2	Design applications in C, using functions, arrays, pointers and structures.
		22CSC29.3	Apply the concepts of Stacks and Queues in solving the problems.
		22CSC29.4	Explore various operations on Linked lists.
		22CSC29.5	Demonstrate various tree traversals and graph traversal techniques.
		22ECC01 - ELECTRONIC DEVICES	
		22ECC01.1	Demonstrate the understanding of the characteristic behavior of Diodes.

20	II / I	22ECC01.2	Apply the acquired knowledge in the analysis of various diode circuits.
		22ECC01.3	Compare and Contrast the characteristics of BJT in various configurations.
		22ECC01.4	Analyze the operation and characteristics of JFET and MOSFET.
		22ECC01.5	Choose an appropriate electronic device for a specific application.
21	II / I	**22ECC02 - EM WAVES AND TRANSMISSION LINES**	
		22ECC02.1	Comprehend the boundary conditions, time varying fields and understand Maxwell's equations in different forms.
		22ECC02.2	Illustrate the Electromagnetic wave properties with respect to different transmission mediums and predict the behavior of reflection and refraction of the waves in different mediums.
		22ECC02.3	Understand the concepts of transmission lines and the significance of Open and Short circuit Lines.
		22ECC02.4	Estimate the transmission line properties, reflection, and matching concepts.
		22ECC02.5	Conceptualizing Microwaves and analyzing the waves in the waveguides.
22	II / I	**22ECC03 - NETWORK ANALYSIS AND SYNTHESIS**	
		22ECC03.1	Recall basics of electrical circuits with Nodal and Mesh analysis.
		22ECC03.2	Illustrate electrical theorems for AC and DC Circuits.
		22ECC03.3	Develop time domain and frequency domain analysis for circuits.
		22ECC03.4	Analyze the electrical network and two port network parameters for different applications i.e., magnetic coupled circuits, Filters.
		22ECC03.5	Synthesize different network functions using Foster and Cauver form.
23	II / I	**22ECC04 - SIGNALS AND SYSTEMS**	
		22ECC04.1	Classify signals, systems and analyse the signals using Transform techniques.
		22ECC04.2	Evaluate signal characteristics using time and frequency domain analysis.
		22ECC04.3	Assess the system stability and causality using ROC and Pole-Zero Plot.
		22ECC04.4	Describe the sampling process and analyse the DT Signal/systems using DTFS, DTFT and Z- Transform.
		22ECC04.5	Apply the Convolution and correlation concepts for analysis of Signal and systems.
		22CSC3 - C AND DATA STRUCTURES LAB	
		22CSC3.1	Understand and trace the execution of programs written in C language.

24	II / I	22CSC3.2	Apply the concepts of looping and decision-making statements for a given problem.
		22CSC3.3	Solve problems using functions, arrays , structures and pointers.
		22CSC3.4	Implementation various operations on stack , queue, tree and graph.
		22CSC3.5	Apply the knowledge of data structure in problem solving.
25	II / I	**22ECC05 - ELECTRONIC DEVICES LAB**	
		22ECC05.1	Demonstrate the characteristic behavior of PN junction diode and Zener diode.
		22ECC05.2	Design various non-linear wave shaping circuits using diodes for a given specification.
		22ECC05.3	Analyze the performance of rectifiers with and without filters.
		22ECC05.4	Examine the characteristics of BJT and FET in various configurations.
		22ECC05.5	Compare the characteristics of special purpose semiconductor diodes.
26	II / I	**22ECC06 - NETWORK ANALYSIS AND SYNTHESIS LAB**	
		22ECC06.1	Identify and measure the passive and active components using electronic equipment and apply Network theorems to AC and DC Circuits.
		22ECC06.2	Determine and analyze two port network parameters.
		22ECC06.3	Design and verification of attenuator and filters.
		22ECC06.4	Simulation of different networks and circuits using the simulation software.
		22ECC06.5	Synthesize different network functions using Foster and Cauer forms.
27	II / I	**22ECI01 - MOOCS / TRAINING / INTERNSHIP**	
		22ECI01.1	Understand Engineer's responsibilities and ethics.
		22ECI01.2	Use various materials, processes, products and quality control.
		22ECI01.3	Provide innovative solutions to solve real world problems.
		22ECI01.4	Acquire knowledge in technical reports writing and presentation.
		22ECI01.5	Apply technical knowledge to real world industrial/rural situations.
28	II / II	**22ECC07 - ANALOG CIRCUITS**	
		22ECC07.1	Apply the knowledge of BJT behavior in the design of various biasing and amplifier circuits.
		22ECC07.2	Relate the knowledge of FET characteristics in the design of various biasing and amplifier circuits.
		22ECC07.3	Apply high and low frequency models of transistor in the analysis of single stage and multistage amplifiers.
		22ECC07.4	Analyze negative feedback amplifier circuits and compare them.
		22ECC07.5	Compare and Contrast different types of Oscillators and Power amplifiers.

29	II / II	**22ECC08 - ANTENNAS AND WAVE PROPAGATION**	
		22ECC08.1	Understand the basic parameters of an antenna.
		22ECC08.2	Understand the radiation properties of antenna and analyze different type of wire antennas.
		22ECC08.3	Analyze the linear arrays for uniform and non-uniform distribution.
		22ECC08.4	Learn the concept of different types of planar antenna.
		22ECC08.5	Study the behavior of radio waves in various mode of wave propagation.
30	II / II	**22ECC09 - CONTROL SYSTEMS**	
		22ECC09.1	Distinguish the closed-loop control systems from open-loop control systems and develop mathematical models in time domain (differential equations, state equations) and S-domain (Transfer function using Laplace transform).
		22ECC09.2	Evaluation of transfer function from block diagram and signal flow graph by using block diagram reduction techniques and Mason gain formula, respectively.
		22ECC09.3	Investigate the stability of control system via Routh-Hurwitz criteria, Root-locus method and Nyquist Plot.
		22ECC09.4	Utilize standard test signals to analyze the time response of first and second-order control systems and frequency response analysis of the control system.
		22ECC09.5	Design and develop various controllers and compensators to control the steady state error, stability and transient response.
31	II / II	**22ECC10 - DIGITAL SYSTEM DESIGN**	
		22ECC10.1	Understand the basic concepts related to digital system design.
		22ECC10.2	Design the combinational and sequential circuits.
		22ECC10.3	Analyze the behavior of the digital system design.
		22ECC10.4	Develop the digital system using various Verilog HDL modeling.
		22ECC10.5	Apply the design concepts of digital system using Verilog HDL.
32	II / II	**22ECC11 - PROBABILITY THEORY AND STOCHASTIC PROCESS**	
		22ECC11.1	Understand fundamentals of Probability and the concept of random variables.
		22ECC11.2	Characterize random distributions.
		22ECC11.3	Determine the Spectral and temporal characteristics of Random Signals.
		22ECC11.4	Analyze the Noise in Communication systems.
		22ECC11.5	Estimate the auto-correlation and power spectral density of linear system response.
		22EEM01 - UNIVERSAL HUMAN VALUES-II: UNDERSTANDING HARMONY	
		22EEM01.1	Become familiar about themselves, and their surroundings (family, society, nature).

33	II / II	22EEM01.2	Develop empathy and respect for diversity by gaining an appreciation for different cultures, perspectives and identities
		22EEM01.3	Exhibit responsible and ethical behavior by adhering to principles of integrity, honesty, compassion, and justice.
		22EEM01.4	Recognize their role as global citizens.
		22EEM01.5	Exhibit a sense of social responsibility.
34	II / II	**22EGM01 - INDIAN CONSTITUTION AND FUNDAMENTAL PRINCIPLES**	
		22EGM01.1	Understand the history of framing of the Indian Constitution and its features.
		22EGM01.2	Assess the realization of Fundamental Rights and Directive Principles of State Policy.
		22EGM01.3	Analyze the challenges to federal system and position of the President and the Prime Minister in the Union Government.
		22EGM01.4	Underline the role of the Legislature and the Judiciary in Union Government and their mutual relations.
		22EGM01.5	Evolve the development of the local governments in India and assess the role of Collector in district administration.
35	II / II	**22ECC12 - ANALOG CIRCUITS LAB**	
		22ECC12.1	Design various BJT and FET biasing circuits to identify the appropriate circuit for faithful amplification.
		22ECC12.2	Experiment with single stage and multistage BJT/FET amplifiers to compare the Gain and Bandwidth.
		22ECC12.3	Compare and contrast different types of feedback topologies.
		22ECC12.4	Develop and test various oscillator circuits.
		22ECC12.5	Evaluate the performance of large signal amplifiers.
36	II / II	**22ECC13 - DIGITAL SYSTEM DESIGN LAB**	
		22ECC13.1	Design a Digital circuit using Verilog HDL.
		22ECC13.2	Understand various abstraction levels of a digital design.
		22ECC13.3	Verify the functionality of a design using Test bench.
		22ECC13.4	Simulate and synthesize combinational logic circuits.
		22ECC13.5	Simulate and synthesize sequential logic circuits.
37	II / II	**22ECC14 - MODELLING AND SIMULATION LAB**	
		22ECC14.1	Simulate the given waveform using standard test signals and sequences in MATLAB.
		22ECC14.2	Analyze the effect of various transformations applied on signals in MATLAB.
		22ECC14.3	Understand the second order system characteristics in LabView.
		22ECC14.4	Simulate the Bode plot and Nyquist plot of the system and analysis its performance characteristics in LabView.
		22ECC14.5	Understand the fundamentals of electronic circuits using Multisim simulation.

38	II / II	**22EGC03 - EMPLOYABILITY SKILLS**	
		22EGC03.1	Become effective communicators, participate in group discussions with confidence and be able to make presentations in a professional context.
		22EGC03.2	Write resumes, prepare and face interviews confidently.
		22EGC03.3	Be assertive and set short term and long term goals, learn to manage time effectively and deal with stress.
		22EGC03.4	Make the transition smoothly from campus to work, use media with etiquette and understand the academic ethics.
		22EGC03.5	Enrich their vocabulary, frame accurate sentences and comprehend passages confidently.
39	III / I	**20ECC15 - COMPUTER ARCHITECTURE AND MICROPROCESSORS**	
		20ECC15.1	Apply fixed and floating-point arithmetic algorithms.
		20ECC15.2	Understand how the computer works.
		20ECC15.3	Classify different organizations of CPU and I/O.
		20ECC15.4	Compare various memories and memory access techniques.
		20ECC15.5	Understand the architecture and instruction set of a microprocessor
40	III / I	**20ECC16 - DIGITAL COMMUNICATION**	
		20ECC16.1	Understand the concept of pulse digital modulation schemes and compare their performance.
		20ECC16.2	Interpret the concept of information theory and apply source coding schemes.
		20ECC16.3	Demonstrate various error control schemes and develop the encoding and decoding techniques to detect and correct the errors.
		20ECC16.4	Analyze different digital modulation schemes and can compute the bit error performance.
		20ECC16.5	Identify and apply spread spectrum modulation techniques.
41	III / I	**20ECC17 - DIGITAL SIGNAL PROCESSING**	
		20ECC17.1	Apply the concept of DFT and FFT for signal processing applications.
		20ECC17.2	Implementation of IIR filters for the given specifications.
		20ECC17.3	Design FIR filters for the given specifications.
		20ECC17.4	Interpret the concepts of Multi-rate digital signal processing and its applications.
		20ECC17.5	Understand the architecture features of TMS320C67XX processor.
		20ECC18 - LINEAR AND DIGITAL INTEGRATED CIRCUITS	
		20ECC18.1	Understand the basic construction, characteristics and parameters of Op-Amp.

42	III / I	20ECC18.2	Analyze the linear and nonlinear applications of Op-Amp.
		20ECC18.3	Explain the concepts of IC555 timer, IC723 regulator, memories and PLD.
		20ECC18.4	Classify and describe the characteristics of different logic families
		20ECC18.5	Design logic functions of Combinational and Sequential circuits with ICs.
43	III / I	**20MBC01 - ENGINEERING ECONOMICS AND ACCOUNTANCY**	
		20MBC01.1	Apply fundamental knowledge of Managerial Economics concepts and tools.
		20MBC01.2	Analyze various aspects of Demand Analysis, Supply and Demand Forecasting.
		20MBC01.3	Understand Production and Cost relationships to make best use of resources available.
		20MBC01.4	Apply Accountancy Concepts and Conventions and preparation of Final Accounts.
		20MBC01.5	Evaluate Capital and Capital Budgeting decision based on any technique.
44	III / I	**PROGRAM ELECTIVE – I** **20ECE01 - CAD FOR VLSI VERIFICATION**	
		20ECE01.1	Justify the importance and use of CAD tools.
		20ECE01.2	Differentiate design flow for different types of ASIC.
		20ECE01.3	Understand the design flows of CADENCE Virtuoso, CADENCE NCLaunch and XILINX ISE
		20ECE01.4	Understand the importance of design for testability
		20ECE01.5	Differentiate various type of simulators.
45	III / I	**20ECE02 - OPTICAL COMMUNICATION**	
		20ECE02.1	Select necessary components required in modern optical communications systems.
		20ECE02.2	Analyze various distortions in optical fibers.
		20ECE02.3	Distinguish the various Optical sources and Optical detectors.
		20ECE02.4	Examine the Power Launching and Coupling and fiber optical receiver.
		20ECE02.5	Determine the performance of Optical Communication link.
46	III / I	**20ECE03 - SIGNAL DETECTION TECHNIQUES**	
		20ECE03.1	Apply and analyze discrete random process concepts in communications.
		20ECE03.2	Understand binary hypothesis techniques
		20ECE03.3	Analyze the various statistical decision techniques.
		20ECE03.4	Demonstrate the various binary detection techniques and M-ary detection.

		20ECE03.5	Evaluate various CFAR detectors.
47	III / I	**20ECE04 - EMBEDDED C PROGRAMMING**	
		20ECE04.1	Analyze the various functions used in embedded C programming.
		20ECE04.2	Understand the evaluation of Arduino family and its development board details.
		20ECE04.3	Interface the sensors and various i/o devices to embedded development board.
		20ECE04.4	Apply the concepts of IoT to embedded development board
		20ECE04.5	Demonstrate and design embedded C based applications.
48	III / I	**20ECE05 - SOFTWARE DEFINED RADIO**	
		20ECE05.1	Understand and compare the Super-heterodyne receiver, SDR and CR.
		20ECE05.2	Analyze the basic architecture of SDR.
		20ECE05.3	Determine the processor based on the application.
		20ECE05.4	Evaluate and choose the various spectrum sensing methods based on application.
		20ECE05.5	Choose the USRP and WARP boards based on the facilities required for an SDR application.
49	III / I	**20ECE06 - PRINCIPLES AND APPLICATIONS OF AI**	
		20ECE06.1	Understand the basics of AI and intelligent agents.
		20ECE06.2	Apply Expert Systems to solve real time problems
		20ECE06.3	Understand knowledge representation methods.
		20ECE06.4	Build algorithms using neural network techniques for various applications.
		20ECE06.5	Solve the various classification problems like object recognition.
50	III / I	**PROGRAM ELECTIVE – II** **20ECE07 - CMOS ANALOG IC DESIGN**	
		20ECE07.1	Recall the elementary concepts of MOS device, MOS amplifiers, Current Mirrors, frequency response and noise.
		20ECE07.2	Classify different types of MOS devices, MOS amplifiers and current mirrors.
		20ECE07.3	Analyze (analytically) a given amplifier circuit for extracting parameters like gain, impedance, bandwidth, noise, etc.
		20ECE07.4	Design an amplifier or it's subcomponent as per the given specification.
		20ECE07.5	Justify with sufficient trade-off the use of an appropriate amplifier or subcomponent for a given specification.

51	III / I	**20ECE08 - MOBILE CELLULAR COMMUNICATION**	
		20ECE08.1	Relate the cellular concepts like frequency reuse, hand off, coverage and capacity.
		20ECE08.2	Analyse the mobile radio propagation with large scale and small scale fading.
		20ECE08.3	Select the suitable diversity technique to combat the multipath fading effects.
		20ECE08.4	Compare the mobile radio standards.
		20ECE08.5	Examine the advance wireless standards.
52	III / I	**20ECE09 - BIOMEDICAL SIGNAL PROCESSING**	
		20ECE09.1	Describe the physiological, physical, and chemical background of the most common bioelectrical phenomena.
		20ECE09.2	Implement signal processing techniques on biomedical signals.
		20ECE09.3	Adapt various detection techniques to identify ECG parameters.
		20ECE09.4	Assess various Signal Processing techniques for analysis of EEG.
		20ECE09.5	Understand the signal processing steps involved in Brain-Computer Interface.
53	III / I	**20ECE10 - SENSORS AND ACTUATORS**	
		20ECE10.1	Understand the fundamental and applications of several different types of sensors and actuators.
		20ECE10.2	Evaluate and perform accurate measurements for any engineering system with clear idea of the potential errors.
		20ECE10.3	Understand the working principles of various transducers.
		20ECE10.4	Select an appropriate transducer for given application.
		20ECE10.5	How to develop a sensor and actuator systems for practical applications.
54	III / I	**20ECE11 - DRONES AND APPLICATIONS**	
		20ECE11.1	Apply the concept of Flight dynamics for building Drone.
		20ECE11.2	Assemble and Program the Drone
		20ECE11.3	Perform Testing and Control operations on the Drone
		20ECE11.4	Apply control mechanism to track and control Parallax ELEV-8 Quadcopter Build.
		20ECE11.5	Use of Drone for real-world applications
		20ECE12 - FUNDAMENTALS OF CLOUD COMPUTING	
		20ECE12.1	Understand the basic concepts of cloud computing.
		20ECE12.2	Describe the characteristics, advantages, risks and challenges associated with cloud computing.

55	III / I	20ECE12.3	Explain and characterize various cloud service models, cloud deployment models.
		20ECE12.4	Investigate/Interpret the security and privacy issues related to cloud computing environments.
		20ECE12.5	Apply the concepts of cloud computing in real world scenario
56	III / I	**20ECC19 - DIGITAL COMMUNICATION LAB**	
		20ECC19.1	Demonstrate various pulse digital modulation techniques.
		20ECC19.2	Assess different line coding techniques.
		20ECC19.3	Detect and correct errors in cyclic codes.
		20ECC19.4	Examine the errors in convolutional encoder and decoder.
		20ECC19.5	Evaluate various digital carrier modulation techniques experimentally.
57	III / I	**20ECC20 - DIGITAL SIGNAL PROCESSING LAB**	
		20ECC20.1	Illustrate linear convolution and correlation using MATLAB.
		20ECC20.2	Design the digital filters using MATLAB.
		20ECC20.3	Examine the performance of multi-rate techniques using MATLAB.
		20ECC20.4	Experiment with decimator and interpolator on DSP processor.
		20ECC20.5	Implement the digital filters on DSP processor.
58	III / I	**20ECC21 - LINEAR AND DIGITAL INTEGRATED CIRCUITS LAB**	
		20ECC21.1	Analyze the configurations, parameters of Op-Amp (IC741).
		20ECC21.2	Demonstrate the circuits of Op-Amp for various applications.
		20ECC21.3	Design the circuits using IC555 timer, IC723 and data converters.
		20ECC21.4	Determine the characteristics of TTL and CMOS gates.
		20ECC21.5	Develop various combinational circuits and sequential circuits using digital ICs.
59	III / I	**20ECI02 - INDUSTRIAL INTERNSHIP/ RURAL INTERNSHIP**	
		20ECI02.1	Understand Engineer's responsibilities and ethics.
		20ECI02.2	Use various materials, processes, products and quality control.
		20ECI02.3	Provide innovative solutions to solve real world problems.
		20ECI02.4	Acquire knowledge in technical reports writing and presentation.

		20ECI02.5	Apply technical knowledge to real world industrial/rural situations.
60	III / II	**20ECC22 - MICROCONTROLLERS**	
		20ECC22.1	Understand the architectures of different microcontrollers to enable to design of applications using them.
		20ECC22.2	Develop code both in assembly and in high level language for various applications of microcontrollers.
		20ECC22.3	Analyze and develop applications by using on-chip peripherals of different microcontrollers.
		20ECC22.4	Interface various I/O Modules with 8051 microcontrollers.
		20ECC22.5	Apply theoretical learning to practical real time problems for automation.
61	III / II	**20ECC23 - VLSI DESIGN**	
		20ECC23.1	Model a digital design using Advanced Verilog HDL constructs.
		20ECC23.2	Analyze the characteristic behavior of MOSFET and discuss CMOS circuit Design Process
		20ECC23.3	Explain various process steps involved in IC fabrication.
		20ECC23.4	Design various NMOS and CMOS based logic circuits.
		20ECC23.5	Discuss the concepts of subsystem designs and Testing.
	PROFESSIONAL ELCTIVE – III **20ECE13 - CPLD AND FPGA ARCHITECTURES**		
62	III / II	20ECE13.1	Explain the concepts of PLDs, CPLDs and FPGAs.
		20ECE13.2	Analyze and compare the various architectures of CPLD and FPGA and its programming technologies.
		20ECE13.3	Implement various logic functions on PLDs, CPLDs and FPGAs.
		20ECE13.4	Understand the concepts of placement and routing and classifying ASICs.
		20ECE13.5	Demonstrate VLSI tool flow for CPLDs and FPGAs.
63	III / II	**20ECE14 - CODING THEORY AND TECHNIQUES**	
		20ECE14.1	Recall the theory and principles of information theory and channel Coding.
		20ECE14.2	Design and analyze the encoding and decoding circuits for various coding techniques.
		20ECE14.3	Apply the principles of abstract algebra, finite fields and its extension to design related codes.
		20ECE14.4	Examine the error detection and correction capability of coding techniques for digital communication.
		20ECE14.5	Evaluate the performance of error control codes using different decoding algorithms.

64	III / II	**20ECE15 - MULTIRATE AND WAVELET SIGNAL PROCESSING**	
		20ECE15.1	Interpret the basics concepts of multirate digital signal processing.
		20ECE15.2	Implement the multirate filter bank structures.
		20ECE15.3	Explore the MRA and classes of wavelets.
		20ECE15.4	Understand the basic concepts of the continuous and discrete wavelet transform.
		20ECE15.5	Explain the special topics such as wavelet packets and Biorthogonal wavelets.
65	III / II	**20ECE16 - REAL TIME OPERATING SYSTEMS**	
		20ECE16.1	Understand Real-time operating system requirements and applications.
		20ECE16.2	Categorize different scheduling approaches for real time scheduler.
		20ECE16.3	Differentiate various RTOS features and POSIX standards.
		20ECE16.4	Analyze the inter task communication in RTOS.
		20ECE16.5	Apply the Linux based embedded system design process.
66	III / II	**20ECE17 - GREEN COMMUNICATION**	
		20ECE17.1	Understand the challenges in energy efficiency and spectral efficiency for digital data transmission.
		20ECE17.2	Conceptualize significant energy efficiency trade off in green wireless networks. Apply the basics of Python programming language, which is used in many IoT devices.
		20ECE17.3	Apply the methods to manage the dynamic loads of mobile communications for energy saving.
		20ECE17.4	Indicate the design practices for power minimization at cellular base station.
		20ECE17.5	Implement cell deployment strategies for efficient network management.
67	III / II	**20ECE18 - CRYPTOGRAPHY AND BLOCKCHAIN TECHNOLOGY**	
		20ECE18.1	Comprehend the key concepts of fundamental cryptography techniques which are required for Blockchain Technology.
		20ECE18.2	Describe the key concepts and compare various models of Blockchain Technology.
		20ECE18.3	Understand consensus mechanism in Blockchain.
		20ECE18.4	Acquire knowledge regarding cryptocurrency transactions and their validation.
		20ECE18.5	Apply the concepts of Blockchain technology in real world scenario.

	PROFESSIONAL ELECTIVE – IV 20ECE19 - DESIGN FOR TESTABILITY		
68	III / II	20ECE19.1	Understand the concepts of testing for VLSI circuits.
		20ECE19.2	Apply techniques to improve testability of VLSI circuits.
		20ECE19.3	Utilize logic simulation methods such as ATPG in testing of VLSI circuits.
		20ECE19.4	Analyze the concepts of BIST in testing of VLSI circuits.
		20ECE19.5	Evaluate various Testing methods
69	III / II	**20ECE20 - SATELLITE COMMUNICATION**	
		20ECE20.1	Demonstrate the fundamental concepts of Orbital Aspects and Orbital Mechanics.
		20ECE202	Identify the mechanisms for placing satellites and examine the orbital effects on satellites, launch mechanisms.
		20ECE20.3	Compare the Multiple access techniques for satellite communications and demonstrate the satellite subsystems.
		20ECE20.4	Design an appropriate satellite communication link for the given specifications.
		20ECE205	Inspect the working principle and related aspects of DBSTV and VSAT.
70	III / II	**20ECE21 - IMAGE AND VIDEO PROCESSING**	
		20ECE21.1	To Learn image representation.
		20ECE21.2	Apply Image enhancement and segmentation techniques both in spatial and frequency domain.
		20ECE21.3	To reduce the redundancy in both lossy and lossless compression models.
		20ECE21.4	Apply 2D-Motion estimation algorithms and develop predictive coding.
		20ECE21.5	Creatively apply contemporary theories, processes and tools in the development and evolution of solutions to problems related to image and video processing.
71	III / II	**20ECE22 - EMBEDDED SYSTEMS**	
		20ECE22.1	Understand the fundamentals of the embedded systems.
		20ECE22.2	Analyze the hardware and software details of the embedded systems.
		20ECE22.3	Design interfacing of the systems with other data handling / processing systems.
		20ECE22.4	Evaluate the performance of an embedded system using various debugging tools.
		20ECE22.5	Apply the embedded design approach for various applications.

72	III / II	**20ECE23 - SMART ANTENNAS**	
		20ECE23.1	Understand the basic principles of Non Uniform and Planar antenna arrays.
		20ECE23.2	Comprehend the necessity of smart antenna and smart antenna configuration.
		20ECE23.3	Understand the DOA estimation methods and compare different algorithms for DOA estimation
		20ECE23.4	Analyze various beamforming algorithms used in a smart antenna system
		20ECE23.5	Describe the fundamentals of the MIMO and RDA antenna systems.
73	III / II	**20ECE24 - DATA ANALYTICS FOR SIGNAL PROCESSING**	
		20ECE24.1	Explain data science fundamentals.
		20ECE24.2	Explore the principles of probability and statistical theory.
		20ECE24.3	Understand various machine learning algorithms using applied statistics.
		20ECE24.4	Analyze supervised and unsupervised learning models with regression and classification techniques.
		20ECE24.5	Construct various applications of image and speech processing using MATLAB/Python.
	PROFESSIONAL ELECTIVE – V **20ECE25 - CMOS DATA CONVERTERS**		
74	III / II	20ECE25.1	Understand Op-Amp based designs.
		20ECE25.2	Explain various performance measures of Data converters.
		20ECE25.3	Design and analyze mixed mode circuits such as Comparator, switched capacitor and sample & hold circuits
		20ECE25.4	Design and analyze an A/D or D/A converter circuits.
		20ECE25.5	Explain principles of oversampling.
75	III / II	**20ECE26 - 5G COMMUNICATIONS**	
		20ECE26.1	Recall the requirements and key functionalities of 4G LTEA/5G NR technology.
		20ECE26.2	Compare various channel access technologies, modulation techniques used in 5G wireless systems.
		20ECE26.3	Illustrate the architecture of 5G and its NextGen core network.
		20ECE26.4	Apply the 5G concepts to D2D communications.
		20ECE26.5	Demonstrate the concept of massive MIMO
		20ECE27 - DSP PROCESSORS AND ARCHITECTURES	
		20ECE27.1	Classify the differences between DSP Processor and General-Purpose processor.

76	III / II	20ECE27.2	Understand the basic architectural needs of Programmable DSPs.
		20ECE27.3	Explain the architecture features of TMS320C55XX processor.
		20ECE27.4	Develop on interface with TMS320C55XX processor to external peripherals.
		20ECE27.5	Design and implement of various signal processing algorithms using 55xx processor.
77	III / II	**20ECE28 - ADVANCED MICROPROCESSORS AND APPLICATIONS**	
		20ECE28.1	Understand the historic evaluation of 80286,386,486.
		20ECE28.2	Explain the basic and advance Pentium features & architecture.
		20ECE28.3	Analyze the Memory Management mechanisms employed in advanced Microprocessors.
		20ECE28.4	Understand the concepts related to SoC Design.
		20ECE28.5	Demonstrate and design a microprocessor based applications.
78	III / II	**20ECE29 - PRINCIPLES OF GNSS**	
		20ECE29.1	Demonstrate the fundamental concepts of communications in understanding of GPS architecture, operation and signal structure.
		20ECE29.2	Apply the principles of orbital mechanics, time references, coordinate systems and range measurements in estimating user position.
		20ECE29.3	Examine the effect of various error sources and satellite geometry on position estimates and analyze the suitability of a given data format.
		20ECE29.4	Compare the architecture and working of other GNSS systems and make use of GNSS systems in a variety of civilian and defense applications.
		20ECE29.5	Relate the knowledge of DGPS techniques in understanding augmentation systems.
79	III / II	**20ECE30 - PATTERN RECOGNITION USING MACHINE LEARNING**	
		20ECE30.1	Understand the concepts of pattern recognition.
		20ECE30.2	Apply the parametric and linear models for classification.
		20ECE30.3	Design algorithms using neural networks for machine learning problems.
		20ECE30.4	Implementation of Support Vector Machines (SVM) algorithm for real time applications.
		20ECE30.5	Evaluate various unsupervised clustering techniques
		20ECC24 - ELECTRONIC DESIGN AND AUTOMATION LAB	

80	III / II	20ECC24.1	Demonstrate the process steps required for simulation /synthesis.
		20ECC24.2	Develop HDL codes/scripts with appropriate syntax.
		20ECC24.3	Apply an appropriate modelling style to describe various combinational and sequential circuits in Verilog HDL.
		20ECC24.4	Examine the successful execution of the codes/ schematic using various Simulation Tools
		20ECC24.5	Build various digital circuits on hardware boards like FPGA.
81	III / II	**20ECC25 - MICROCONTROLLERS LAB**	
		20ECC25.1	Develop the programs of 8051 and ARM using their respective instruction set.
		20ECC25.2	Understand the usage of various debugging tools available to program different microcontrollers.
		20ECC25.3	Build code for 8051 and ARM7 to interface various input/output modules.
		20ECC25.4	Analyze the hardware and software interaction and integration.
		20ECC25.5	Design and develop the 8051 and ARM 7 based embedded systems for various applications.
82	III / II	**20ECC26 - MINI PROJECT**	
		20ECC26.1	Formulate mini project proposal through literature survey.
		20ECC26.2	Plan, design and analyze the proposed mini project.
		20ECC26.3	To simulate and execute the mini project for validation.
		20ECC26.4	Enhance oral presentation skills.
		20ECC26.5	Prepare and submit the mini project report.
83	III / II	**20EGC03 - EMPLOYABILITY SKILLS**	
		20EGC03.1	Become effective communicators, participate in group discussions with confidence and be able to make presentations in a professional context.
		20EGC03.2	Write resumes, prepare and face interviews confidently.
		20EGC03.3	Be assertive and set short term and long term goals, learn to manage time effectively and deal with stress.
		20EGC03.4	Make the transition smoothly from campus to work, use media with etiquette and understand the academic ethics.
		20EGC03.5	Enrich their vocabulary, frame accurate sentences and comprehend passages confidently.
84	IV / I	**20ECC27 - COMPUTER NETWORKS**	
		20ECC27.1	Relate the communication tasks with basic concept of networking, protocols and Service models at different layers and interpret the design issues of Data link layer using protocols and services

		20ECC27.2	Apply random accessing Protocols for Medium Access Control.
		20ECC27.3	Examine the performance of network and Internetworking with routing algorithms and the congestion control approaches.
		20ECC27.4	Understand the transport layer and Application Layer concepts.
		20ECC27.5	Demonstrate the Application layer Protocols.
85	IV / I	**20ECC28 - MICROWAVE AND RADAR ENGINEERING**	
		20ECC28.1	Apply the wave equations and their solutions to analyze the waves in the waveguides.
		20ECC28.2	Determine the scattering matrix for various microwave components.
		20ECC28.3	Analyze the interaction of electron beam and RF field for various microwave sources.
		20ECC28.4	Examine the principles of operation of pulse, CW and MTI radar system.
		20ECC28.5	Compare different types of tracking radars.
	PROFESSIONAL ELECTIVE – VI 20ECE31 - VLSI TECHNOLOGY		
86	IV / I	20ECE31.1	Describe the various processing steps (including base materials, layers, clean room) involved in the IC fabrication.
		20ECE31.2	Illustrate the crystal growth, wafer processing and cleaning methods.
		20ECE31.3	Analyze the oxidation and lithography processes with its parameters.
		20ECE31.4	Explain the doping and etching methods used in IC fabrication.
		20ECE31.5	Outline the deposition, packaging and testing concepts applied for VLSI circuits.
		20ECE32 - MOBILE ADHOC AND SENSOR NETWORKS	
87	IV / I	20ECE32.1	Understand the concepts of Ad Hoc Networks and Wireless Sensor Networks.
		20ECE32.2	Analyze different routing algorithm for Ad Hoc Networks and Wireless Sensor Networks.
		20ECE32.3	Acquire the knowledge of various protocols of Mobile Ad Hoc and Sensor Networks.
		20ECE32.4	Discuss various security practices in Ad Hoc and sensor networks.

		20ECE32.5	Comprehend various sensor network platforms, tools and applications.
88	IV / I	**20ECE33 - SPEECH PROCESSING**	
		20ECE33.1	Understand the basic characteristics of speech signal in relation to production and hearing of speech by humans.
		20ECE33.2	Analyze speech and extract features for speech applications.
		20ECE33.3	Distinguish between different speech coding techniques.
		20ECE33.4	Use dynamic warping and HMM for real time problems.
		20ECE33.5	Design the various applications like recognition, synthesis, and coding of speech.
89	IV / I	**20ECE34 - IoT AND ITS APPLICATIONS**	
		20ECE34.1	Understand the terminology, enabling technologies, and various protocols of IoT.
		20ECE34.2	Illustrate the concepts of Machine to Machine, SDN, and NFV and build simple IoT systems using Raspberry Pi board, NodeMCU, and BeagleBone Black.
		20ECE34.3	Apply the basics of Python programming language, which is used in many IoT devices.
		20ECE34.4	Create the steps involved in IoT system design methodology.
		20ECE34.5	Develop web applications using a python-based framework called Django and IoT technologies for domain-specific applications.
90	IV / I	**20ECE35 - REMOTE SESING**	
		20ECE35.1	Understand the fundamental concepts of remote sensing.
		20ECE35.2	Appreciate types of remote sensing and digital imaging.
		20ECE35.3	Apply Microwave remote sensing techniques and understand the process of photogrammetry.
		20ECE35.4	Interpret images visually.
		20ECE35.5	Apply Digital image processing techniques.
91	IV / I	**20ECE36 - NETWORK SECURITY**	
		20ECE36.1	Familiarize the basic concepts of Computer Security and Security Attacks, Services, Mechanisms, Design principles.
		20ECE36.2	Understand the Symmetric Encryption and Message Confidentiality principles and operation.
		20ECE36.3	Demonstrate the Public-Key Cryptography and Message Authentication algorithms.

		20ECE36.4	Examine the Key Distribution using symmetric and asymmetric encryption and User Authentication using Public Key Infrastructure.
		20ECE36.5	Apply Network Security and System Security approaches for different applications.
92	IV / I	**20EGM04 - GENDER SENSITIZATION**	
		20EGM04.1	Understand the difference between "Sex" and "Gender" and be able to explain socially constructed theories of identity.
		20EGM04.2	Recognize shifting definitions of "Man" and "Women" in relation to evolving notions of "Masculinity" and "Femininity".
		20EGM04.3	Appreciate women's contributions to society historically, culturally and politically.
		20EGM04.4	Analyze the contemporary system of privilege and oppressions, with special attention to the ways gender intersects with race, class, sexuality, ethnicity, ability, religion, and nationality.
		20EGM04.5	Demonstrate an understanding of personal life, the workplace, the community and active civic engagement through classroom learning.
93	IV / I	**20ECC29 - COMPUTER NETWORKS LAB**	
		20ECC29.1	Apply fundamental principles of computer networking.
		20ECC29.2	Examine the performance of design issues of Link layer.
		20ECC29.3	Construct a network and measure its performance with different routing algorithms.
		20ECC29.4	Create a wired and wireless Network.
		20ECC29.5	Analyze performance of various Network protocols.
94	IV / I	**20ECC30 - IoT AND SIMULATION LAB**	
		20ECC30.1	Analyze various software and hardware components required for IoT technology.
		20ECC30.2	Interface analog and digital sensing & actuating equipment using Raspberry Pi.
		20ECC30.3	Learn how to build basic applications in the LabVIEW graphical programming environment.
		20ECC30.4	Develop an ability for programming in LabVIEW using various program structures, plotting the graphs and charts for system monitoring, processing, and controlling.
		20ECC30.5	Apply knowledge of IoT and Virtual Instruments to solve engineering problems.
		20ECC31 - MICROWAVE ENGINEERING LAB	
		20ECC31.1	Examine the characteristics of RKO and Gunn Oscillator.

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95	IV / I	20ECC31.2	Compare the relation between guide wavelength, free space wavelength and cut off wavelength.
		20ECC31.3	Measure VSWR for various loads at microwave frequencies.
		20ECC31.4	Estimate the microwave power ratios at various ports of microwave components.
		20ECC31.5	Evaluate unknown impedance of various microwave loads.
96	IV / I	**20ECC32 - PROJECT: PART-1**	
		20ECC32.1	List the various approaches to the selected problem.
		20ECC32.2	Interpret the advantages and disadvantages of various approaches.
		20ECC32.3	Apply the selected approach for simulating / modeling / designing the problem.
		20ECC324	Analyze and write a report on the results of the simulation/modeling of the problem selected.
		20ECC32.5	Justify and present the results of the simulation/modeling / design before the departmental committee.
97	IV / I	**20ECI03 - INDUSTRIAL INTERNSHIP**	
		20ECI03.1	Understand Engineer's responsibilities and ethics.
		20ECI03.2	Use various materials, processes, products and quality control.
		20ECI03.3	Provide innovative solutions to solve real world problems.
		20ECI03.4	Acquire knowledge in technical reports writing and presentation.
		20ECI03.5	Apply technical knowledge to real world industrial situations.
98	IV / II	**20ECC33 - TECHNICAL SEMINAR**	
		20ECC33.1	Collect, Organize, Analyze and Consolidate information about emerging technologies from the literature.
		20ECC33.2	Exhibit effective communication skills, stage courage, and confidence.
		20ECC33.3	Demonstrate intrapersonal skills.
		20ECC33.4	Explain new innovations/inventions in the relevant field.
		20ECC33.5	Prepare and experience in writing the Seminar Report in a prescribed format.
99	IV / II	**20ECC37 - PROJECT: PART-2**	
		20ECC37.1	Recall the details of the approach for the selected problem.
		20ECC37.2	Interpret the approach to the problem relating to the assigned topic.
		20ECC37.3	Determine the action plan to conduct investigation.

		20ECC37.4	Analyze and present the model / simulation /design as needed.
		20ECC37.5	Evaluate, present and report the results of the analysis and justify the same.