Department of Electronics and Communication Engineering

B.Tech (ECE) – R20 – Curriculum Subjects

1.4.1. Course Outcomes

Semester No.	**I Year / I Semester**		
Course Title:	**Linear Algebra and Calculus**	**Course Code**	**MA101BS**
Course Code.CO No	**Course Outcome statement**		
MA101BS. 1	**Analyze** and solve systems of linear equations using matrix methods and evaluate matrix rank.		
MA101BS.2	**Evaluate** eigenvalues and eigenvectors to transform quadratic forms into canonical form.		
MA101BS.3	**Analyze** convergence of infinite series using appropriate convergence tests.		
MA101BS.4	**Evaluate** applications of Mean Value Theorems in function analysis.		
MA101BS.5	**Solve** improper integrals using Beta and Gamma functions.		
MA101BS.6	**Optimize** problems using partial derivatives for maxima and minima.		

Semester No.	**I Year / I Semester**		
Course Title:	**Engineering Chemistry**	**Course Code**	**CH102**
Course Code.CO No	**Course Outcome statement**		
CH102/202BS.1	**Analyze** boiler troubles and select suitable water softening and treatment methods.		
CH102/202BS.2	**Differentiate** atomic and molecular orbitals and evaluate band theory in solids.		
CH102/202BS.3	**Evaluate** electrode potentials and determine EMF of electrochemical cells using the Nernst equation.		
CH102/202BS.4	**Analyze** fuel characteristics and evaluate combustion performance parameters.		
CH102/202BS.5	**Evaluate** polymer properties and recommend corrosion prevention materials and methods.		

Semester No.	I Year / I Semester		
Course Title:	Programming for Problem Solving	Course Code	CS103ES
Course Code.CO No	Course Outcome statement		
CS103ES.1	**Design** algorithms and flowcharts to solve computational problems.		
CS103ES.2	**Develop** C programs from algorithms and flowcharts.		
CS103ES.3	**Implement** and test C programs to solve logical and computational problems.		
CS103ES.4	**Design** modular and reusable C programs using functions.		
CS103ES.5	**Evaluate** and implement arrays, pointers, strings, and structures in C programs.		
CS103ES.6	**Analyze** and compare searching and sorting techniques for efficient problem solving.		

Semester No.	I Year / I Semester		
Course Title:	Engineering Graphics	Course Code	ME104ES.1
Course Code.CO No	Course Outcome statement		
ME104ES.1	**Understand and interpret** standard engineering drawings, symbols, conventions, and specifications used to communicate technical ideas		
ME104ES.2	**Estimate and construct** different projections of **points, lines, planes, and solids**, including sectional views, using engineering drawing principles.		
ME104ES.3	**Analyze** spatial relationships and geometrical features to determine true shapes, true lengths, and sectional details of engineering components..		
ME104ES.4	**Sketch and develop** accurate **two-dimensional orthographic drawings** and **three-dimensional isometric views** of engineering objects.		
ME104ES.5	**Create and modify** precise **two-dimensional orthographic drawings** using **AutoCAD software** in accordance with industrial drawing standards.		

Semester No.	I Year / I Semester		
Course Title:	English	Course Code	CEN105HS
Course Code.CO No	Course Outcome statement		
CEN105HS.1	**Demonstrate** effective use of English in spoken and written communication.		
CEN105HS.2	**Analyze** and interpret texts to respond appropriately in academic and professional contexts.		

CEN105HS.3	**Demonstrate** confident communication in diverse social, academic, and cross-cultural environments.
CEN105HS.4	**Develop** integrated language proficiency in reading, writing, listening, and speaking skills.

Semester No.	**I Year / I Semester**		
Course Title:	**Engineering Chemistry Lab**	**Course Code**	**CH106BS**
Course Code.CO No	**Course Outcome statement**		
CH106BS.1	Analyze water quality for its various parameters and its significance in industries.		
CH106BS.2	**Define** redox titrations and to determine the presence of ions in food sample using permanganometry		
CH106BS.3	**Analyze** the quality of coal and will be to determine the moisture content of coal		
CH106BS.4	**Analyze** the operating principles of pH and conductivity meters and apply them for suitable analytical applications.		
CH106BS.5	**Synthesize** the polymers ,rubber and to list the applications of polymers		

Semester No.	**I Year / I Semester**		
Course Title:	**Programming for Problem Solving Lab**	**Course Code**	**CS107ES**
Course Code.CO No	**Course Outcome statement**		
CS107ES .1	**Demonstrate** computer system and program development process		
CS107ES .2	**Design** algorithms and develop programs using control structures		
CS107ES .3	**Design** and develop programs using functions and arrays		
CS107ES .4	**Develop** programs for managing memory using pointers and for processing strings		
CS107ES .5	**Implement** file handling techniques to organize and manage heterogeneous and large-scale data.		
CS107ES .6	**Develop** programs to implement different linear data structures		

Semester No.	I Year / I Semester		
Course Title:	English Language and Communication Skills Lab	Course Code	CEN108HS
Course Code.CO No	Course Outcome statement		
CEN108HS.1	**Analyze** and apply nuances of English language through audio-visual learning and collaborative activities.		
CEN108HS.2	**Demonstrate** intelligible speech by applying accent neutralization techniques.		
CEN108HS.3	**Demonstrate** clear and confident speaking skills for professional and employability contexts.		

Semester No.	I Year / II Semester		
Course Title	Differential Equations and Vector Calculus	Course Code	MA201BS
Course Code.CO No	Course Outcome statement		
MA201BS. 1	**Analyze** and solve first-order differential equations using appropriate analytical methods.		
MA201BS. 2	**Analyze** and solve first-order differential equations using appropriate analytical methods.		
MA201BS. 3	**Evaluate** line, surface, volume integrals and convert one another by using multiple integrals.		
MA201BS. 4	**Analyze** scalar and vector fields using gradient, divergence, and curl operations.		
MA201BS. 5	**Apply** vector integration techniques to evaluate line, surface, and volume integrals in engineering problems.		

Semester No.	I Year / II Semester		
Course Title:	Applied Physics	Course Code	AP202BS
Course Code.CO No	Course Outcome statement		
AP202BS.1	**Analyze** wave-particle behavior and solve wave functions for quantum systems.		
AP202BS.2	**Analyze** and differentiate semiconductor devices based on characteristics and applications.		
AP202BS.3	**Evaluate** material properties and select appropriate materials for engineering applications..		
AP202BS.4	**Analyze** properties of normal light and laser systems and evaluate their communication applications.		
AP202BS.5	**Classify** nanomaterials based on fabrication techniques and evaluate their engineering applications..		

Semester No.	I Year / II Semester		
Course Title:	**Data Structures**	**Course Code**	**CS203ES**
Course Code.CO No	**Course Outcome statement**		
CS203ES.1	**Evaluate and select** data structures that effectively model the information in a problem.		
CS203ES .2	**Analyze** efficiency Trade-offs among different data structure implementations or combinations**.**		
CS203ES.3	**Implement** algorithms for sorting and pattern matching and analyze their applications.		
CS203ES.4	**Design** programs using a variety of data structures including hash tables, binary and general tree structures, search trees, tries, heaps, graphs and AVL trees.		
CS203ES.5	**Design** programs using tries data structures for efficient searching and retrieval.		

Semester No.	I Year / II Semester		
Course Title:	**Basic Electrical Engineering**	**Course Code**	**EE204.1**
Course Code.CO No	**Course Outcome statement**		
EE204.1	**Apply** circuit laws and theorem to determine the response of the circuit		
EE204.2	**Analyze** and evaluate series and parallel AC circuits using mathematical and experimental methods.		
EE204.3	**Estimate** the losses and efficiency of electrical machines.		
EE204.4	**Analyze** the characteristics of DC machines.		
EE204.5	**Evaluate** various performance parameters of AC machines.		

Semester No.	I Year / II Semester		
Course Title:	Engineering Workshop	Course Code	ME205ES
Course Code.CO No	Course Outcome statement		
ME205ES.1	**Demonstrate** assembly, disassembly, and configuration of personal computer systems.		
ME205ES.2	**Apply** workshop trade practices to manufacture basic engineering components.		
ME205ES.3	**Apply** appropriate tools for various engineering workshop processes.		
ME205ES.4	**Apply** basic electrical engineering knowledge for house wiring practice.		
ME205ES.5	**Design** and implement basic computer networking for information sharing between systems.		

Semester No.	I Year / II Semester		
Course Title:	Applied Physics Lab	Course Code	AP206BS
Course Code.CO No	Course Outcome statement		
AP206BS.1	Apply relevant principles, theories, and formulas to conduct and analyze experimental results.		
AP206BS.2	**Choose** the appropriate procedures and techniques for the different experiments.		
AP206BS.3	**Identify** the different measuring devices and meters to record the data accurately.		
AP206BS.4	**Apply** the mathematical concepts/equations to obtain results		
AP206BS.5	**Analyze** the experimental applications in real life by interpreting the results		

Semester No.	I Year / II Semester		
Course Title:	Data Structures Lab	Course Code	CS207ES
Course Code.CO No	Course Outcome statement		
CS207ES.1	**Implement and Analyze** linear Data Structure such as Arrays ,Linked list, Stacks and Queues		
CS207ES .2	**Implement and Analyze** Non Linear Data Structure such as Trees and Graphs		
CS207ES.3	**Apply** searching and sorting Algorithms to solve problems.		
CS207ES.4	**Implement** Algorithms for Graphs traversal (DFS_BFS)		
CS207ES.5	**Design** and Implement Pattern matching Algorithm		

Semester No.	I Year / II Semester		
Course Title:	Basic Electrical Engineering LAB	Course Code	EE208ES
Course Code.CO No	Course Outcome statement		
EE208ES.1	**Apply** the basic electrical laws.		
EE208ES.2	**Analyze** the response of different types of electrical circuits to different		
EE208ES.3	**Evaluate** the efficiency, regulation of electrical machines**.**		
EE208ES.4	**Analyze** starting and running performance characteristics of electrical machines under different operating conditions.		
EE208ES.5	**Estimate** the performance characteristics of Electrical machines		

Semester No.	II Year / I Semester		
Course Title:	Electronic Devices and Circuits	Course Code	EC301PC
Course Code.CO No	Course Outcome statement		
EC301PC.1	**Explain** the construction, characteristics, and operation of diodes, BJTs, FETs, and special-purpose semiconductor devices.		
EC301PC.2	**Analyze** V–I characteristics, switching behavior, and small-signal models of semiconductor devices..		
EC301PC.3	**Apply** diode and transistor concepts to design rectifiers, clippers, clampers, regulators, and biasing circuits.		
EC301PC.4	**Design** and analyze small-signal BJT and FET amplifiers.		

EC301PC.5	**Evaluate** the performance of semiconductor devices and amplifier circuits to recommend appropriate device and biasing choices for specific applications.

Semester No.	**II Year / I Semester**		
Course Title:	**Digital System Design**	**Course Title:**	**EC302PC**
Course Code.CO No	**Course Outcome statement**		
EC302PC.1	**Understand** the numerical information in different forms and Boolean Algebra theorems		
EC302PC.2	**Evaluate** the Postulates of Boolean algebra and to minimize combinational functions		
EC302PC.3	**Design** and analyze combinational and sequential circuits.		
EC302PC.4	**Analyze** the Finite state machines		
EC302PC.5	**Design** and compare logic gate implementations using different logic families		

Semester No.	**II Year / I Semester**		
Course Title:	**Signals and Systems**	**Course Code**	**EC303PC**
Course Code.CO No	**Course Outcome statement**		
EC303PC.1	**Analyze** different types of signals and systems using orthogonal functions, vector analogy, and fundamental time-domain functions.		
EC303PC.2	**Apply** Fourier series and Fourier transform techniques to represent, analyze, and interpret the spectral characteristics of continuous-time signals.		
EC303PC.3	**Evaluate** the behavior of linear time-invariant systems using impulse response, convolution, transfer functions, distortionless transmission, and system bandwidth concepts.		
EC303PC.4	**Apply** and differentiate Laplace and Z-transform methods to model and study signals and systems, emphasizing ROC determination and domain-specific characteristics.		
EC303PC.5	**Apply** concepts of sampling, aliasing, correlation, and spectral characteristics to recover useful information from signals in noisy environments.		

Semester No.	II Year / I Semester		
Course Title:	Laplace Transforms, Numerical Methods &Complex Variables	Course Code	MA304BS
Course Code.CO No	Course Outcome statement		
MA304BS.1	**Apply Laplace transform techniques** to analyze standard functions, solve integrals, determine inverse transforms, and solve ordinary differential equations.		
MA304BS.2	**Apply** numerical methods such as Bisection, Newton–Raphson, Regula–Falsi, and interpolation formulas to obtain approximate solutions for algebraic and transcendental equations.		
MA304BS.3	**Apply** suitable numerical techniques to **compute approximate solutions** of first-order ODEs.		
MA304BS.4	**Analyze** the complex function with reference to their analyticity, integration using Cauchy's Integral and Residue theorems.		
MA304BS.5	**Evaluate** complex integrals using the Taylor's and Laurent's series expansions ofcomplex functions.		

Semester No.	II Year / I Semester		
Course Title:	Probability Theory & Stochastic Process	Course Code	EC305ES
Course Code.CO No	Course Outcome statement		
EC305ES.1	**Explain** the fundamental concepts of probability theory, including random variables, probability distributions, and their properties.		
EC305ES.2	**Apply** probability concepts to solve statistical averages		
EC305ES.3	**Analyze** stochastic processes, including stationary, ergodic processes, Auto correlation		
EC305ES.4	**Evaluate** the statistical properties of random signals using power spectral density.		
EC305ES.5	**Explain** the nature of noise in communication systems and **analyze** the fundamental principles of information theory, including source and channel coding techniques.		

Semester No.	II Year / I Semester		
Course Title:	Electronic Devices and Circuits lab	Course Code	EC306PC
Course Code.CO No	Course Outcome statement		
EC306PC.1	**Verify** and analyze the characteristics of basic electronic devices such as **PN junction diodes, Zener diodes, BJTs, FETs, and SCRs** through laboratory		
EC306PC.2	**Construct** and evaluate the performance of **rectifiers, voltage regulators, and amplifier circuits** using appropriate electronic components.		
EC306PC.3	**Analyze** the **switching characteristics of a transistor** by measuring **rise time, fall time, delay time, and storage time**.		
EC306PC.4	**Evaluate h-parameters** of transistor configurations.		
EC306PC.5	**Design**, test, and analyze **wave-shaping circuits** such as **clippers and clampers** under different reference voltages and input signals.		

Semester No.	II Year / I Semester		
Course Title:	Digital System Design Lab	Course Code	EC307PC
Course Code.CO No	Course Outcome statement		
EC307PC.1	**Analyze** and demonstrate the operation of fundamental digital logic gates through laboratory experiments.		
EC307PC.2	**Apply** Boolean algebra to minimize logic expressions and design the optimized logic using appropriate logic gates..		
EC307PC.3	**Analyze** the operation of medium complexity standard combinational circuits like adder/subtractor, encoder, decoder, multiplexer, de multiplexer code converters, comparators.		
EC307PC.4	**Analyze** the operation of counters and shift registers using flip flops		
EC307PC .5	**Analyze** the operation of a sequence detector-a finite state machine		

Semester No.	II Year / I Semester		
Course Title:	Signals and Systems Lab	Course Code	EC308ES
Course Code.CO No	Course Outcome statement		
EC308ES.1	**Analyze** the generation of Various Signals and Sequences in MATLAB, including the operations on Signals and Sequences.		
EC308ES.2	**Demonstrate** the importance of Fourier Transform, Laplace Transform and Z Transform in the analysis of signals and systems.		
EC308ES.3	**Determine** the Convolution and Correlation between Signals and sequences.		
EC308ES.4	**Evaluate** the **Sampling Theorem** and analyze its implications in signal reconstruction.		

EC308ES.5	**Analyze** the concepts of Linearity, Stationary of random process, Gibb's phenomenon, wiener-khinchin relations and Gaussian function.

Semester No.	**II Year / II Semester**		
Course Title:	**Network Analysis and Transmission Lines**	**Course Code**	**EC401PC**
Course Code.CO No	**Course Outcome statement**		
EC401PC.1	**Explain and analyze** the behavior of basic RLC circuits under different excitation conditions.		
EC401PC.2	**Analyze and evaluate** the steady-state and transient responses of RLC circuits using appropriate mathematical techniques.		
EC401PC.3	**Explain and determine** the characteristics of two-port network parameters for given electrical networks.		
EC401PC.4	**Analyze and compute** transmission line parameters and compare different transmission line configurations.		
EC401PC.5	**Develop and formulate** state-space models from block diagrams of dynamic systems.		
EC401PC.6	**Analyze and evaluate** system controllability and observability, and **design compensators** to improve system performance.		

Semester No.	**II Year / II Semester**		
Course Title:	**Analog and Digital Communications**	**Course Code**	
Course Code.CO No	**Course Outcome statement**		
EC402PC.1	**Understand** how the analog communication systems work and different methods of analog communication techniques and their types		
EC402PC.2	**Explain** the types of angle modulation and demonstrate the methods of **FM** signal transmission and reception**.**		
EC402PC.3	**Analyze** the working principles of AM and FM transmitters and receivers**.**		
EC402PC.4	**Explain** the different types of pulse modulation transmission and reception techniques.		
EC402PC.5	**Explore** the generation and detection of digital modulation techniques and **Evaluate** the performance of baseband transmission and optimal receiver		

Semester No.	II Year / II Semester		
Course Title:	Linear IC Applications	Course Code	EC403PC
Course Code.CO No	Course Outcome statement		
EC403PC.1	**Analyze** the characteristics of operational amplifiers		
EC403PC.2	**Design** the solutions for various linear and non-linear applications of op-amp		
EC403PC.3	**Design** the active filters, oscillators and waveform generators using op-amp		
EC403PC.4	**Explain** functional diagrams and applications of IC 555 and IC 565		
EC403PC.5	**Analyze** the operating principles of different ADC and DAC converters		

Semester No.	II Year / II Semester		
Course Title:	Electronic Circuit Analysis	Course Code	EC404PC
Course Code.CO No	Course Outcome statement		
EC404PC.1	**Construct** different types of multistage amplifiers and Analyze high frequency response of BJT amplifiers.		
EC404PC.2	**Apply** the feedback concepts for analysis of different feedback amplifiers.		
EC404PC.3	**Analyze** different oscillator circuits to generate audio & radio frequency sinusoidal signals.		
EC404PC.4	**Evaluation** of gain for different types of power amplifiers as per the specifications.		
EC404PC.5	**Design** multivibrators for various applications and Design time based generators using various techniques.		

Semester No.	II Year / II Semester		
Course Title:	Control Systems	Course Code	EC405PC
Course Code.CO No	Course Outcome statement		
EC405PC.1	**Understand** the fundamentals of control systems		
EC405PC.2	**Analyze** the time response of control systems		
EC405PC.3	**Analyze** frequency response using Bode and Nyquist plots and evaluate system stability.		
EC405PC.4	**Design** and implement feedback controllers		

EC405PC.5	**Develop and analyze state-space models** of continuous- and discrete-time systems, and Evaluate the controllability and Observability of control systems for effective state-feedback and state-estimation design.

Semester No.	**II Year / II Semester**		
Course Title:	**Analog and Digital Communication Lab**	**Course Code**	**EC406PC**
Course Code.CO No	**Course Outcome statement**		
EC406PC.1	**Demonstrate** generation and detection of analog modulation techniques.		
EC406PC.2	**Apply** time and frequency division multiplexing concepts in different pulse modulation techniques.		
EC406PC.3	**Demonstrate** the generation of PCM, DM signals from analog signals.		
EC406PC.4	**Analyze &**implement different pulse modulation techniques like PAM, PWM and PPM.		
EC406PC.5	**Analyze &**implement the digital modulation techniques.		

Semester No.	**II Year / II Semester**		
Course Title:	**IC Applications Lab**	**Course Code**	**EC407PC**
Course Code.CO No	**Course Outcome statement**		
EC407PC.1	**Design** and Analyze Operational Amplifier Circuits		
EC407PC.2	**Implement** Active Filter Circuits and Waveform Generators		
EC407PC.3	**Analyze** and implement Astable, Monostable, and Bistable multivibrator circuits.		
EC407PC.4	**Analyze** and Implement Phase-Locked Loop (PLL) and Voltage Regulation Circuits		
EC407PC.5	**Analyze** and Implement Signal Conditioning and Schmitt Trigger Circuits		

Semester No.	II Year / II Semester		
Course Title:	Electronic Circuit Analysis LAB	Course Code	EC407PC
Course Code.CO No	Course Outcome statement		
EC407PC.1	**Design** & Analysis of different amplifier circuits using hardware and software tools.		
EC407PC.2	**Design** &Analysis of different feedback amplifier using hardware and software tools.		
EC407PC.3	**Design** &Analysis of different oscillators using hardware and software tools.		
EC407PC.4	**Analysis** of different Power amplifier circuits using hardware and software tools.		
EC407PC.5	**Analysis** of different Multivibratators using hardware and software tools.		

Semester No.	III Year / I Semester		
Course Title:	Business Economics & Financial Analysis	Course Code	SM501MS
Course Code.CO No	Course Outcome statement		
SM501MS.1	**Understand** the concepts of business economics and concept organizations existing in the modern Business.		
SM501MS.2	**Define** microeconomic factors in related to demand and supply analysis and its forecasting		
SM501MS.3	**Apply** the theory of production function and Cost concepts to determine the Break Even Analysis and remember different market structures, pricing strategies and different forms business organization		
SM501MS.4	**Prepare** and analyze financial statements using fundamental accounting principles.		
SM501MS.5	**Analyze** and interpret financial statements using ratio analysis, fund flow analysis, and cash flow statements.		

Semester No.	III Year / I Semester		
Course Title:	Microprocessors & Microcontrollers	Course Code	EC502PC.1
Course Code.CO No	Course Outcome statement		
EC502PC.1	**Demonstrate** the internal organization of 8086 microprocessor along with its instruction set and addressing modes, pins description.		
EC502PC.2	**Develop** an assembly language programs using 8051 instructions.		

EC502PC.3	**Design** and implement interfacing circuits between a microcontroller and I/O devices.
EC502PC.4	**Examine** the internal architecture and data flow of ARM processor.
EC502PC.5	**Explain** the internal organization and functional features of Cortex and OMAP processors**.**

Semester No.	**III Year / I Semester**		
Course Title:	**Digital Signal Processing**	**Course Code**	**EC503PC**
Course Code.CO No	**Course Outcome statement**		
EC503PC.1	**Analyze** discrete-time signals and systems, and design and implement digital filters using various realization techniques		
EC503PC.2	**Apply** DFS, DFT, FFT techniques to analyze periodic sequences and understand their interrelation with other transforms for efficient signal representation and processing		
EC503PC.3	**Design** and implement IIR digital filters to process discrete time signals.		
EC503PC.4	**Design** and implement FIR digital filters to process discrete time signals		
EC503PC.5	**Describe** and **analyze** multirate signal processing techniques and evaluate the effects of round-off errors in digital systems.		

Semester No.	**III Year / I Semester**		
Course Title:	**Electromagnetic Fields & Waves**	**Course Code**	**EC504PC**
Course Code.CO No	**Course Outcome statement**		
EC504PC.1	**Analyze** electrostatic field laws and apply them to solve field distribution problems.		
EC504PC.2	**Analyze** electrostatic field laws and apply them to solve field distribution problems.		
EC504PC.3	**Differentiate** static and time-varying electromagnetic fields and formulate Maxwell's equations with boundary conditions.		
EC504PC.4	**Analyse** the Wave Equations for good conductors, good dielectrics and **evaluate** the UPW Characteristics for several practical media of interest.		
EC504PC.5	**Analyse** the rectangular waveguides, their mode characteristics, and design waveguides for solving practical problems.		

Semester No.	III Year / I Semester		
Course Title:	PE -1 Digital Image and Video Processing	Course Code	EC512PE
Course Code.CO No	Course Outcome statement		
EC512PE.1	**Define** and explain digital image**,** their representation**,** and the advantages of transform-domain representations**.**		
EC512PE.2	**Apply** image enhancement techniques such as histogram processing and filtering**,** and analyze image degradation models**.**		
EC512PE.3	**Analyze** and evaluate image segmentation and compression techniques for efficient image processing applications		
EC512PE.4	**Explain** 3D video representation and analyze filtering techniques used for noise removal in video sequences**.**		
EC512PE.5	**Implement** the various coding techniques used for motion estimation in video		

Semester No.	III Year / I Semester		
Course Title:	Microprocessors & Microcontrollers Lab	Course Code	EC505PC
Course Code.CO No	Course Outcome statement		
EC505PC.1	**Develop** and execute 8086 assembly language programs to perform arithmetic, logical, string, and branch operations**.**		
EC505PC.2	**Develop** and execute 8051 assembly language programs for arithmetic operations**,** byte- and bit-level logical operations**,** and control instructions		
EC505PC.3	**Analyze** and implement timer-based delay generation, serial communication, and interrupt-driven programs on the 8051 microcontroller.		
EC505PC.4	**Design** and implement real-time control programs using 8051 timers and interrupts**,** including square-wave generation and external interrupt handling**.**		
EC505PC.5	**Design** and interface I/O peripherals with 8051.		

Semester No.	III Year / I Semester		
Course Title:	Digital Signal Processing Lab	Course Code	EC506PC
Course Code.CO No	Course Outcome statement		
EC506PC.1	**Apply** the basic operations on continuous and discrete elementary signals.		
EC506PC.2	**Evaluate** impulse response and step response of a given difference equation theoretically & by using a suitable software and compare the results.		
EC506PC.3	**Compute** N-point DFT as well N-point FFT (Both DIT and DIF) of a given sequence and also plot magnitude and phase response.		
EC506PC.4	**Perform** Convolution of (Linear and circular) two sequences using DFT and IDFT.		
EC506PC.5	**Design** and **implement** IIR and FIR digital filter to meet the given specification using suitable software		

Semester No.	III Year / I Semester		
Course Title:	Advanced Communication Skills Lab	Course Code	EN505HS
Course Code.CO No	Course Outcome statement		
EN505HS.1	**Develop and apply** English fluency by **acquiring and using** appropriate vocabulary, thereby **demonstrating** effective interpersonal communication skills.		
EN505HS.2	**Analyze and interpret** textual content to **demonstrate comprehension** and **extract meaning** from written materials.		
EN505HS.3	**Apply and construct** professional writing skills by **creating** letters, emails, resumes, and reports in appropriate formats.		
EN505HS.4	**Organize, present, and communicate** ideas effectively through poster presentations, PPTs, projects, and team-based activities.		
EN505HS.5	**Evaluate and implement** interview strategies by **practicing, assessing, and demonstrating** confidence in interview situations.		

Semester No.	III Year / II Semester		
Course Title:	**Embedded Systems Design**	**Course Code**	**EC601PC**
Course Code.CO No	**Course Outcome statement**		
EC601PC.1	**Differentiate and classify** general-purpose computing systems and embedded systems based on their characteristics and application domains.		
EC601PC.2	**Explain and illustrate** the core components and architecture of an embedded		
EC601PC.3	**Demonstrate and apply** knowledge of programming environments used for embedded system development.		
EC601PC.4	**Design** real time embedded systems using the concepts of RTOS.		
EC601PC.5	**Analyze** the relationship between task synchronization mechanisms and latency issues in embedded systems.		

Semester No.	III Year / II Semester		
Course Title:	**Antennas and wave propagation**	**Course Code**	**EC602PC**
Course Code.CO No	**Course Outcome statement**		
EC602PC.1	**Explain** the basic principles of radiation and the fundamentals of antenna parameters such as gain, directivity, and radiation pattern.		
EC602PC.2	**Analyze** the performance of various antenna types such as dipole, loop, and aperture antennas for specific applications.		
EC602PC.3	**Explain** the setup and instrumentation required for measuring key antenna parameters and Calculate the antenna parameters		
EC602PC.4	**Design** the antennas to meet specific requirements in terms of frequency, bandwidth, and radiation characteristics		
EC602PC.5	**Analyze** fundamental concepts of electromagnetic wave propagation in different transmission media. & **Evaluate** the propagation characteristics of electromagnetic waves in different media.		

Semester No.	III Year / II Semester		
Course Title:	VLSI Design	Course Code	EC602PC
Course Code.CO No	Course Outcome statement		
EC602PC.1	**Explain** fundamentals of IC technology and testing of CMOS circuits.		
EC602PC.2	**Analyze and select** an appropriate inverter using MOS electrical characteristics.		
EC602PC.3	**Draw and design** layout of any logic circuit using concepts of stick diagrams and design rules.		
EC602PC.4	**Analyze** characteristics of different logic gates.		
EC602PC.5	**Design** memories and building blocks of data path of sub system.		
EC602PC.6	**Design** logic circuits using PLA's, PAL's, FPGA's and CPLD's.		

Semester No.	III Year / II Semester		
Course Title:	PE- II FPGA Programming	Course Code	EC622PE
Course Code.CO No	Course Outcome statement		
EC622PE. 1	**Explain** the architecture of SPLD's, CPLD's and FPGA's		
EC622PE. 2	**Illustrate and apply** the Universal Design Methodology for Programmable Devices.		
EC622PE. 3	**Develop and implement** VHDL and Verilog programs for digital circuits using data flow and behavioral descriptions.		
EC622PE. 4	**Develop and implement** VHDL and Verilog programs for digital circuits using structural and switch-level descriptions.		
EC622PE. 5	**Analyze** the mixed type descriptions, Procedures, Tasks and understand about		

Semester No.	III Year / II Semester		
Course Title:	OE - 1 JAVA Programming	Course Code	CS614OE
Course Code.CO No	Course Outcome statement		
CS614OE.1	**Design** and implement software solutions using object-oriented programming principles and abstract classes.		
CS614OE.2	**Analyze and implement** multithreaded applications using synchronization mechanisms.		
CS614OE.3	**Apply and solve** programming problems using the Java Collection Framework and I/O classes.		
CS614OE.4	**Develop and implement** applications using JDBC-ODBC connectivity.		
CS614OE.5	**Design** GUI based applications and web applications		

Semester No.	III Year / II Semester		
Course Title:	Scripting Languages Lab	Course Code	EC604ES
Course Code.CO No	Course Outcome statement		
EC604ES.1	**Apply and utilize** scripting language compilers and platforms to **develop and execute** scripting language programs.		
EC604ES.2	**Explain** and Apply Object oriented features and Scripting languages concepts.		
EC604ES.3	**Analyze and differentiate** between scripting languages and programming languages based on features and applications.		
EC604ES.4	**Develop and implement** programs using Ruby, Perl, and TCL to **perform** process control calculations, **manipulate** arrays, and **access** recipe data.		
EC604ES.5	**Monitor, analyze, and modify** functional elements and sequence parameters in scripting-based systems.		

Semester No.	III Year / II Semester		
Course Title:	ECAD LAB	Course Code	EC605PC
Course Code.CO No	Course Outcome statement		
EC605PC.1	**Demonstrate** the ability to implement and verify the functionality of basic and advanced combinational logic circuits, including logic gates, encoders, decoders, multiplexers, demultiplexers, and code converters.		
EC605PC.2	**Design** and simulate arithmetic and sequential circuits, such as full adders, flip-flops, counters, and finite state machines, using various modeling styles.		
EC605PC.3	**Develop** skills in designing and analyzing CMOS-based digital circuits, including inverters, logic gates (NOR, NAND, XOR, XNOR), and pass transistor circuits.		
EC605PC.4	**Perform, analyze, and verify** physical design processes including layout creation, placement and routing, and physical verification for CMOS-based designs, while **evaluating** functionality and performance using timing and parasitic analyses.		
EC605PC.5	**Apply and utilize** Electronic Design Automation (EDA) tools to **design, simulate, and optimize** combinational and sequential digital circuits for modern VLSI applications.		

Semester No.	IV Year / I Semester		
Course Title:	Data Communication and Networks	Course Code	EC701PC
Course Code.CO No	Course Outcome statement		
EC701PC.1	**Analyze** and compare signal concepts, OSI, and TCP/IP reference models and evaluate functionalities of their network layers.		
EC701PC.2	**Discuss** and Analyze flow control and error control mechanisms.		
EC701PC.3	**Demonstrate and apply** routing mechanisms used for data transfer in the network layer.		
EC701PC.4	**Explain and evaluate** the significance of various flow control and congestion control mechanisms..		
EC701PC.5	**Analyze** the functioning of various application layer protocols.		

Semester No.	IV Year / I Semester		
Course Title:	MICROWAVE ENGINEERING	Course Code	EC702PC
Course Code.CO No	Course Outcome statement		
EC702PC.1	**Analyze** the rectangular waveguides and their mode characteristics		
EC702PC.2	**Explain** the functioning of different types of wave guides and ferrite components for engineering applications		
EC702PC.3	**Analyze and evaluate** microwave generation techniques and **determine** performance parameters of Klystrons, Magnetrons, and TWTs.		
EC702PC.4	**Develop** the concepts of TEDs, RWH Theory and explain the salient features of Gunn Diodes and ATT Devices.		
EC702PC.5	**Derive and apply** S-parameters for microwave junctions and **analyze** measurement characteristics.		

Semester No.	IV Year / I Semester		
Course Title:	**OE – II Python Programming**	**Course Code**	**CS724OE**
Course Code.CO No	**Course Outcome statement**		
CS724OE.1	**Analyze and apply** Python syntax and semantics, and **demonstrate proficiency** in using Python flow control structures and functions.		
CS724OE.2	**Demonstrate and apply** string handling techniques and file system operations in Python.		
CS724OE.3	**Develop, execute, and manipulate** Python programs using core data structures such as lists and dictionaries, and **apply** regular expressions.		
CS724OE.4	**Explain and implement** Object-Oriented Programming concepts using Python.		
CS724OE.5	**Design and develop** applications related to network programming, web services, and database operations using Python.		
CS724OE.6	**Develop** the skill of designing Graphical user Interfaces in Python.		

Semester No.	IV Year / I Semester		
Course Title:	PE – III Wireless Communication Networks	Course Code	EC731PE
Course Code.CO No	Course Outcome statement		
EC731PE.1	**Analyze** fundamental principles of cellular system design and evaluate their impact on wireless communication performance.		
EC731PE.2	**Analyze** different types of wireless networks and evaluate their operational characteristics and applications.		
EC731PE.3	**Analyze and evaluate** the design and performance of traditional and emerging wireless networks.		
EC731PE.4	**Explain and analyze** the role of radio propagation in wireless communications, including large-scale path loss, small-scale fading, and multipath effects.		
EC731PE.5	**Analyze** the importance of the Equalization and Diversity in Wireless Communication		

Semester No.	IV Year / I Semester		
Course Title:	PE – IV Electronic Measurements and Instrumentation	Course Code	EC743PE
Course Code.CO No	Course Outcome statement		
EC743PE.1	**Analyze** static and dynamic characteristics of measurement systems and evaluate their impact on measurement accuracy and performance.		
EC743PE.2	**Demonstrate** and **Evaluate** the Operation of Measuring Instruments		
EC743PE.3	**Analyze** and Differentiate Signal Analyzers and Generators		
EC743PE.4	**Operate** and Interpret Oscilloscope Measurements for signal analysis.		
EC743PE.5	**Analyze and apply** transducers in measurement systems for various applications.		
EC743PE.6	**Design** and Implement Measurement Solutions Using Bridges and Data Acquisition Systems.		

Semester No.	IV Year / I Semester		
Course Title:	Data Communications and Networks Lab	Course Code	EC703PC
Course Code.CO No	Course Outcome statement		
EC703PC.1	**Develop** TCL scripts for network simulation		
EC703PC.2	**Evaluate** and compare network performance		
EC703PC.3	**Analyze and evaluate** network scheduling mechanisms.		
EC703PC.4	**Evaluate** protocols in terms of performance		
EC703PC.5	**Simulate** and analyze routing and network protocols		

Semester No.	IV Year / I Semester		
Course Title:	Microwave Engineering Lab	Course Code	EC704PC
Course Code.CO No	Course Outcome statement		
EC704PC.1	**Apply** the principles of microwave components, to analyze their characteristics using a microwave test bench		
EC704PC.2	**Evaluate** the Voltage Standing Wave Ratio under different load conditions and interpret the results to **assess** transmission line performance.		
EC704PC.3	**Analyze** the scattering parameters of microwave devices, to determine their behavior and functionality in microwave circuits.		
EC704PC.4	**Apply measurement techniques and analyze** waveguide parameters to **determine** propagation performance.		
EC704PC.5	**Design** and **conduct** experiments to observe and analyze antenna radiation patterns and its performance		

Semester No.	IV Year / I Semester		
Course Title:	Industry Oriented Mini Project /Summer Internship	Course Code	EC705PROJ
Course Code.CO No	Course Outcome statement		
EC705PROJ.1	**Analyze** real-world engineering problems and formulate project objectives addressing user and societal needs.		
EC705PROJ.2	**Design** and develop a feasible solution using appropriate engineering tools, techniques, and methodologies.		
EC705PROJ.3	**Implement** the designed solution and test its performance using suitable experimental or simulation methods.		
EC705PROJ.4	**Work effectively** in a team by demonstrating leadership, professional ethics, and communication skills during project execution.		
EC705PROJ.5	**Prepare** technical documentation and present project outcomes considering technical, economic aspects.		

Semester No.	IV Year / I Semester		
Course Title:	PROJECT STAGE -1	Course Code	EC706PROJ
Course Code.CO No	Course Outcome statement		
EC706PROJ.1	**Identify** and analyze real-world engineering problems and formulate clear problem statements based on societal, industrial, or research needs.		
EC706PROJ.2	**Conduct** comprehensive literature surveys by reviewing research papers, technical reports, and existing solutions to understand current trends and		
EC706PROJ.3	**Design** and propose suitable methodologies, system architecture, and implementation strategies to address the identified problem		
EC706PROJ.4	**Evaluate** the feasibility of the proposed solution considering technical,		
EC706PROJ.5	**Prepare** and present detailed project proposals with effective technical documentation, teamwork, and professional communication skills.		

Semester No.	IV Year / II Semester		
Course Title:	OE – III Software Testing Methodologies	Course Code	CS8331OE
Course Code.CO No	Course Outcome statement		
CS8331OE.1	**Apply** the basic concepts of software testing and able to identify the various bugs and correcting after knowing the consequences of the bug		
CS8331OE.2	**Evaluate** software reliability using transaction flow testing and domain testing across multiple input data sets.		
CS8331OE.3	**Demonstrate** knowledge in solving Boolean expressions by using KV charts		
CS8331OE.4	**Develop** knowledge in comparing the various testing strategies like state graphs and transition testing		
CS8331OE.5	**Apply** the knowledge of tools like J meter or win runner for solving state graph		

Semester No.	IV Year / II Semester		
Course Title:	PE – V Network security and cryptography	Course Code	EC851PE
Course Code.CO No	Course Outcome statement		
EC851PE.1	**Analyze** cryptography and network security principles and evaluate their applications in securing communication systems.		
EC851PE.2	**Analyze** encryption algorithms and evaluate characteristics of advanced symmetric block ciphers and conventional encryption techniques.		
EC851PE.3	**Analyze** and evaluate various security threats, malware, spyware, viruses, and system vulnerabilities.		
EC851PE.4	**Solve** message authentication, functions, algorithms, applications.		
EC851PE.5	**Identify** and explain the characteristics of viruses, worms, firewalls, security services, and security management mechanisms used in information and network security. **.**		

Semester No.	IV Year / II Semester		
Course Title:	PE – VI Global Positioning System	Course Code	EC863PE
Course	Course Outcome statement		
EC863PE.1	**Analyze** different types of GPS navigation systems and evaluate their operational principles and applications.		
EC863PE.2	**Analyze** the working principles of GPS modules and implement them to design and develop location-based navigation, tracking, and monitoring systems		
EC863PE.3	**Analyze** GPS architecture and GEO satellite systems and evaluate their role in navigation and communication applications.		
EC863PE.4	**Identify** error sources in GPS observations, and apply the corrections for accurate positioning		
EC863PE.5	**Estimate** and map geographical features using appropriate surveying, positioning, and geospatial data analysis techniques. .		

Semester No.	IV Year / II Semester		
Course Title:	SEMINAR	Course Code	EC801PROJ
Course Code.CO No	Course Outcome statement		
EC801PROJ.1	**Identify**, analyze, and interpret recent technological developments and research trends in the relevant engineering domain.		
EC801PROJ.2	**Critically** evaluate technical literature, research papers, and emerging technologies to gain in-depth domain knowledge.		
EC801PROJ.3	**Organize** and present technical information effectively using appropriate presentation tools and structured documentation.		
EC801PROJ.4	**Demonstrate** professional communication, analytical thinking, and confidence while presenting and defending technical ideas.		
EC801PROJ.5	**Develop** self-learning ability, research orientation, and awareness of current industrial and societal technological needs.		

Semester No.	IV Year / II Semester		
Course Title:	PROJECT STAGE -1I	Course Code	EC802PROJ
Course Code.CO No	Course Outcome statement		
EC802PROJ.1	**Analyze**, develop, and evaluate innovative ideas and technical information to solve complex problems in the field of Electronics and Communication		
EC802PROJ.2	**Identify**, assess, and formulate application design requirements to propose sustainable, environmentally conscious, socially relevant, and cost-effective engineering solutions.		
EC802PROJ.3	**Apply** appropriate techniques, resources modern engineering and tools for Modeling , Simulation & Testing of the System		
EC802PROJ.4	**Demonstrate** effective professional communication skills through technical documentation, presentations, teamwork, and knowledge dissemination.		
EC802PROJ.5	**Apply** professional ethics, social responsibility, and environmental considerations in the development and deployment of engineering solutions.		