Paper Code	Course Title	Course Outcome
ELSACOR01T	Basic Circuit Theory and Network Analysis	CO1 Study circuits in a systematic manner suitable for analysis and design. CO2 Understands how to formulate circuit analysis problems in a mathematically tractable way with an emphasis on solving linear systems of equations. CO3 Analyze the electric circuit using network theorems. CO4 Determine Sinusoidal steady state response. CO5 Understand the two–port network parameters with an ability to find out two-port network parameters & overall response for interconnection of two-port networks
ELSACOR01P	Basic Circuit Theory and Network Analysis Lab	CO1 Verify the network theorems and operation of typical electrical and electronic circuits. CO2 Choose the appropriate equipment for measuring electrical quantities and verify the same for different circuits. CO3 Prepare the technical report on the experiments carried.
ELSACOR02T	Mathematics Foundation for Electronics	CO1 Use mathematics as a tool for solving/modeling systems in electronics CO2 Solve non-homogeneous linear differential equations of any order using a variety of methods, solve differential equations using power series and special functions CO3 Understand methods to diagonalize square matrices and find eigenvalues and corresponding eigenvectors for a square matrix, and check for its diagonalizability CO4 Familiarize with the concept of sequences, series and recognize convergent, divergent, bounded, Cauchy and monotone sequences. CO5 Perform operations with various forms of complex numbers to solve equations
ELSACOR02P	Mathematics Foundation for Electronics Lab	CO1 Perform operations with various forms of complex numbers to solve equations CO2 Use mathematics as a tool for solving/modeling systems in electronics

		CO3 Prepare the technical report on the experiments carried.
ELSACOR03T	Semiconductor Devices	CO1 Describe the behavior of semiconductor materials CO2 Reproduce the I-V characteristics of diode/BJT/MOSFET devices CO3 Apply standard device models to explain/calculate critical internal parameters of semiconductor devices CO4 Explain the behavior and characteristics of power devices such as SCR/UJT etc.
ELSACOR03P	Semiconductor Devices Lab	CO1 Examine the characteristics of basic semiconductor devices. CO2 Perform experiments for studying the behavior of semiconductor devices for circuit design applications. CO3 Calculate various device parameters' values from their IV characteristics CO4 Interpret the experimental data for better understanding the device behavior.
ELSACOR04T	Applied Physics	CO1 Explain the limitation of classical physics and basic concepts of quantum physics, CO2 Describe the mechanical, thermal and magnetic properties of materials. CO3 Understand the various thermal effects life seebeck and peltier effect and their usefulness in solving the real life problems
ELSACOR04P	Applied Physics Lab	CO1 Perfrom lab experiments for studying mechanical, thermal and magnetic parameters of materials CO2 Calculate and determine mechanical parameters such as young modulus, rigidity etc. CO3 Collect data and Present it in the form of lab report
ELSACOR05T	Electronics Circuits	CO1 Illustrate about rectifiers, transistor and FET

		amplifiers and its biasing. Also compare the performances of its low frequency models. CO2 Describe the frequency response of MOSFET and BJT amplifiers. CO3 Explain the concepts of feedback and construct feedback amplifiers and oscillators. CO4 Summarizes the performance parameters of amplifiers with and without feedback
ELSACOR05P	Electronics Circuits Lab	CO1 Understand and analyze electronic circuits. CO2 Choose the appropriate equipment for measuring electrical quantities and verify the same for different circuits. CO3 Ability to understand and apply circuit theorems and concepts in engineering applications CO4 Prepare the technical report on the experiments carried.
ELSACOR06T	Digital Electronics and Verilog/VHDL	CO1 Understand and represent numbers in powers of base and converting one from the other, carry out arithmetic operations CO2 Understand basic logic gates, concepts of Boolean algebra and techniques to reduce/simplify Boolean expressions CO3 Analyze and design combinatorial as well as sequential circuits CO4 Explain the concepts related to PLD's CO5 Use VLSI design methodologies to understand and design simple digital systems & Understand the HDL design flow and capability of writing programs in VHDL/Verilog CO6 Familiar with Simulation and Synthesis Tools, Test Benches used in Digital system design
ELSACOR06P	Digital Electronics and	CO1 Apply VLSI design methodologies to understand

	Verilog/VHDL Lab	and design simple digital systems. CO2 Familiarize with Simulation and Synthesis Tools, Test Benches used in Digital system design CO3 Write programs in VHDL/Verilog CO4 Prepare the technical report on the experiments carried.
ELSACOR07T	C Programming and Data Structures	CO1 Write code in C language for arithmetic and logical problems CO2 Implement conditional branching, iteration and recursion. CO3 Use concept of modular programming by writing functions and using them to form a complete program CO4 Understand the concept of arrays, pointers and structures and use them to develop algorithms and programs for implementing searching and sorting
ELSACOR07P	C Programming and Data Structures Lab	CO1 Implement conditional branching, iteration and recursion. CO2 Write Programs in C for arithmetic and logical operations. CO3 Prepare the technical report on the experiments carried.
ELSACOR08T	Operational Amplifiers and Applications	CO1 Infer the DC and AC characteristics of operational amplifiers and its effect on output and their compensation techniques. CO2 Elucidate and design the linear and non linear applications of an op-amp and special application ICs. CO3 Explain and compare the working of multi vibrators using special application IC 555 and general purpose op-amp.
ELSACOR08P	Operational Amplifiers and Application Lab	CO1 Interpret op-amp data sheets. CO2 Analyze and prepare the technical report on the experiments carried out. CO3 Design application oriented circuits using Op-amp and 555 timer ICs. CO4 Create and demonstrate live project using ICs.

		CO5 Prepare the technical report on the experiments carried.
ELSACOR09T	Signals & Systems	CO1 Represent various types of continuous-time and discrete-time signals CO2 Understand concept of convolution, LTI systems and classify them based on their properties and determine the response of LTI system CO3 Determine the impulse response, step response and frequency response of LTI systems CO4 Analyze system properties based on impulse response and Fourier analysis. CO5 Analyze the spectral characteristics of continuous-time periodic and a periodic signals using Fourier analysis CO6 Understand Laplace transform and its properties and apply the Laplace transform to obtain impulse and step response of simple circuits.
ELSACOR09P	Signals & Systems Lab	CO1 Learn the practical implementation issues stemming from the lecture material and CO2 Learn the use of simulation tools and design skills. CO3 Learn to work in groups and to develop MATLAB simulations of various signals and systems. CO4 Prepare the technical report on the experiments carried.
ELSACOR010T	Electronic Instrumentation	CO1 Describe the working principle of different measuring instruments. CO2 Choose appropriate measuring instruments for measuring various parameters in their laboratory courses. CO3 Correlate the significance of different measuring instruments, recorders and

		oscilloscopes.
ELSACOR010P	Electronic Instrumentation Lab	CO1 Perform experiments on the measuring instruments. CO2 Perform measurements of various electrical/electronic parameters using appropriate instruments available in the laboratory. CO3 Prepare the technical report on the experiments carried.
ELSACOR011T	Microprocessor and Microcontrollers	CO1 Understand the basic blocks of microcomputers i.e CPU, Memory, I/O and architecture of microprocessor's and Microcontroller's CO2 Apply knowledge and demonstrate proficiency of designing hardware interfaces for memory and I/O as well as write assembly language programs for target microprocessor and microcontroller. CO3 Derive specifications of a system based on the requirements of the application and select the appropriate Microprocessor or Microcontroller
ELSACOR011P	Microprocessor and Microcontrollers Lab	CO1 Be proficient in use of IDE's for designing, testing and debugging microprocessor and microcontroller based system CO2 Interface various I/O devices and design and evaluate systems that will provide solutions to real-world problem CO3 Prepare the technical report on the experiments carried.
ELSACOR012T	Electromagnetics	CO1 Understand the fundamentals of Electrostatics and Magnetostatics hence get the insight of the characteristics of materials and their interactions with electric and magnetic fields

		CO2 Understand the application of Vector Differential and Integral operators in Electromagnetic Theory. CO3 Interpret Maxwell's equations in differential and integral forms, both in time and frequency domains.. CO4 Describe the complex ε, μ, and σ, plane waves, Snell's laws from phase matching, and calculate the reflection and transmission coefficients at the interface of simple media CO5 Calculate input impedance and reflection coefficient of an arbitrarily terminated transmission-line and can use Smith chart to convert these quantities.
ELSACOR012P	Electromagnetics Lab	CO1 Design capacitors & inductors and analyze their characteristics. Also, they become efficient in solving simple boundary value problems, using Poisson's equation. CO2 Interpret a Smith chart and also become familiar with describing & recognizing fundamental properties of waveguide modes. CO3 Calculate the cutoff frequency and propagation constant for parallel plate, rectangular, and dielectric slab waveguides. Also, they can calculate the resonant frequency of simple cavity resonators. CO4 Analyze problems involving TEM-waves.
ELSACOR013T	Communication Electronics	CO1 Design basic digital communication systems to solve a given communications problem and they become conversant with the requirements and the protocols employed in the fundamental components in a communication network.

		CO2 Understand simple block forward error correction codes and basic dispersion compensation concepts and also the concepts of up/down conversion and modulation CO3 Determine the suitability of a particular communication system to a given problem CO4 Describe the concept of "noise" in analog and digital communication systems. Also, get insight on the trade-offs (in terms of bandwidth, power, and complexity requirements) in basic digital communication systems.
ELSACOR013P	Communication Electronics Lab	CO1 Understand basic elements of a communication system. CO2 Analyze the baseband signals in time domain and in frequency domain. CO3 Build understanding of various analog and digital modulation and demodulation techniques. CO4 Prepare the technical report on the experiments carried
ELSACOR014T	Photonics	CO1 Describe the optics and simple optical systems. CO2 Understand the concept of light as a wave and the relevance of this to optical effects such as interference and diffraction and hence to lasers and optical fibers. CO3 Use mathematical methods to predict optical effects with e.g. light-matter interaction, interference, fiber optics, geometrical optics
ELSACOR014P	Photonics Lab	CO1 Perform experiments based on the phenomenon of light/photons. CO2 Measure the parameters such as wavelength, resolving power, numerical aperture etc. using the appropriate photonic/optical technique.

		CO3 Prepare the technical report on the experiments carried.
ELSADSE01T	Power Electronics	CO1 Explain the basic principles of switch mode power conversion, models of different types of power electronic converters including dc-dc converters, PWM rectifiers and inverters CO2 Choose appropriate power converter topologies and design the power stage and feedback controllers for various applications They use power electronic simulation packages for analyzing and designing power converters CO3 Describe the operation of electric machines, such as motors and generators and their electronic controls. CO4 Analyze the performance of electric machine
ELSADSE01P	Power Electronics Lab	CO1 Reproduce the characteristics of power semicondcutor devices like SCR, DIAC, TRIAC etc. CO2 Calculate the various device parameters from their characteristics. CO3 Design power control circuits using semicondcutor power devices. CO4 Prepare the technical report on the experiments carried.
ELSADSE02T	Control Systems	CO1 Understand the concepts of closed loop control systems. CO2 Analyse the stability of closed loop systems. CO3 Apply the control techniques to any electrical systems. CO4 Compute and assess system stability.
ELSADSE02P	Control Systems Lab	CO1 Perform experiments involving concepts of control systems CO2 Design experiments for controlling devices like AC/DC motors etc.

		CO3 Design interfacing circuits for peripherals like I/O, A/D, D/A, timer etc. CO4 Develop systems using different microcontrollers.
ELSADSE03T	Transmission Lines, Antenna and Wave Propagation	CO1 Describe the principals of electromagnetic wave propagation and various effects involved in it CO2 Explain the phenomenon of transmission line and its types. CO3 Perform calculation for finding out performance parameters of transmission lines like losses SWR CO4 Understand the modes of transmission in waveguides and other components involved in microwave communications.
ELSADSE03P	Transmission Lines, Antenna and Wave Propagation Lab	CO1 Understand the working of various components involved in antenna and wave propagation. CO2 Perform experiments for studying the performance of transmission lines, waveguides and antenna. CO3 Prepare a technical report on the experiment performed
ELSADSE04T	Modern Communication Systems	CO1 Apply the basic knowledge of signals and systems and understand the basics of communication system and analog modulation techniques. CO2 Apply the knowledge of digital electronics and understand the error control coding techniques. CO3 Summarize different types of communication systems and its requirements. CO4 Design and Analyse the performance of communication systems.
ELSADSE04P	Modern Communication Systems Lab	CO1 Understand the functioning of various digital communication techniques CO2 Calculate the performance parameters involved in electronic communication systems CO3 Prepare the technical report on the experiments carried.
ELSADSE05T	Digital Signal Processing	CO1 Understand the basic concepts related to discrete time signals, systems, Z transform and Fourier

		transform CO2 Apply knowledge and demonstrate proficiency of analyzing signals in time as well as frequency domain using Fourier and Z transforms CO3 Design and analyze IIR/FIR filters with given specifications CO4 Apply transform methods for representing signals and systems in time and frequency domain
ELSADSE05P	Digital Signal Processing Lab	CO1 Draw signal flowgraphs of discrete time systems and analyze and derive properties of LTI systems CO2 Apply transform methods for representing signals and systems in time and frequency domain CO3 Simulate, synthesize and process signals using software tools CO4 Prepare the technical report on the experiments carried.
ELSADSE06T	Computer Networks	CO1 Understand the fundamentals of computer networks and issues involved. CO2 Understand the set of rules and procedures that mediates the exchange of information between communicating devices.
ELSACOR06P	Computer Networks Lab	CO1 Understand the fundamentals of computer networks and issues involved. CO2 Use the set of rules and procedures that mediates the exchange of information between communicating devices. CO3 Write programming using open source tools CO4 Prepare lab report on the experiments performed
SEC1	Design and Fabrication of Printed Circuit Boards	CO1 Familiarize with the type of devices/components that may be mounted on PCB CO2 Understand the PCB layout techniques for optimized component density and power

		saving. CO3 Perform design and printing of PCB with the help of various image transfer and soldering techniques CO4 Understand the trends in the current PCB industry
SEC2	Robotics	CO1 Familiarize with the programming environments used in robotics applications. CO2 Understand the working of sensors, actuators and other components used in design and implementation of robotics. CO3 Design timer/counter circuits and display their outputs using LCD and other indicator devices CO4 Understand the communication standards like RS232 etc.