Department of ECE

IV-II Semester, R15		
Course Code	**Course Name**	**Course Outcomes (COs)**
15A04802	Low Power VLSI Circuits & Systems	CO1: Understand the importance of low power circuits and concepts of MOS Transistors Impact Ionization and Hot Electron Effects.
		CO2 Implement Low power design approaches for system level and circuit level measures.
		CO3: Design low power adders, multipliers and memories for efficient design of systems.
		CO4: Analyze the finite state machine model.
		CO5: Create low power VLSI Circuits using Low power VLSI.
15A04803	Pattern Recognition & Applications	CO1: Explain the fundamentals of pattern recognition techniques.
		CO2:Analyze classification problems probabilistically and estimate classifier performance.
		CO3: Demonstrate the principles of Bayesian parameter estimation.
		CO4: Apply maximum likelihood parameter estimation such as density models and HMM.
		CO5:Construct the neural network approach to pattern recognition & their applications.
15A04806	Technical Seminar	CO1: Demonstrate factual knowledge like fundamental principles and theories
		CO2: Develop critical thinking and specific skill about topics of current intellectual importance.
		CO3:Improve both technical report writing and presentation skills.
15A04807	Project Work	CO1: Choose an effective project making implementation of technical and engineering knowledge gained from courses with the awareness of technology on the society and ethical responsibilities.
		CO2: Identify the modern tools required for the optimum implementation of the project.
		CO3: Demonstrate team work ability and communication skills.
		CO4: Prepare the final project report with improvements.
IV-I Semester, R15		
15A04701	Optical Fiber Communication	CO1:Understand basic fundamental theory of fiber optics.
		CO2: Discuss the channel impairments like attenuation,

		scattering losses, bending losses and dispersion.
		CO3: Demonstrate basic mechanism of light generation.
		CO4: Analyze the detection of light.
		CO5:Design architectures of optical fiber communication systems.
5A04702	Embedded Systems	CO1: Explain the concepts of an embedded system
		CO2: Explain the architecture of TM4C Microntrollers
		CO3: Illustrate the design concepts of an embedded system
		CO4: Summarize the peripherals of TM4C Microcontrollers
		CO5:Categorize the embedded Communication Protocols.
15A04703	Microwave Engineering	CO1: Analyze completely the rectangular waveguides, their mode characteristics, and design waveguides for solving practical microwave transmission line problems.
		CO2:Distinguish between the different types of waveguide and ferrite components, explain their functioning and select proper components for engineering applications.
		CO3: Analyze the characteristics of microwave tubes.
		CO4: Analyze the characteristics of cross field tubes and understand the operation of microwave solid state devices.
		CO5: Apply the properties of s-parameters to waveguide components and evaluate the various microwave parameters using microwave bench setup.
15A04704	Data Communications and Networking	CO1: Discuss standards and functionalities of key networking models.
		CO2: Describe the switching techniques and design issues of physical layer.
		CO3: Describe the functionalities and design issues of the data link layer.
		CO4: Illustrate the protocol functionalities and design issues of network layer.
		CO5: Demonstrate protocols used in Transport layer.
15A04705	Radar Systems	CO1: Understand the basic concepts of Radar system
		CO2: Analyze the CW Radar and FMCW Radar system for the measurement of speed and distance.
		CO3: Apply the techniques to remove the clutter using MTI Radar and Pulse Doppler Radar.
		CO4: Discriminate different Radar subsystems in both Transmitter and Receiver sections.

		CO5: Design the different tracking mechanisms and estimate the matched filter response.
15A04709	Cellular & Mobile Communication	CO1: Explain impairments due to multipath fading channel.
		CO2: Analyze the fundamental techniques to overcome the different fading effects.
		CO3: Compare Co-channel and Non Co-channel interferences.
		CO4: Demonstrate cell coverage for signal and traffic, diversity techniques and mobile antennas.
		CO5: Explain the frequency management, channel assignment and types of handoff.
15A04711	Microwave and Optical Communication Laboratory	CO1: Learn the characteristics of Reflex Klystron and Gunn Diode, Directional Coupler and measure VSWR, Attenuation, frequency, wavelength and impedance of microwaves
		CO2: Analyze the scattering parameters used to characterize devices and system behaviour
		CO3: Learn the characteristics of LED, laser diode and measure the data rate for Digital Optical link, losses for Analog Optical link, Numerical Aperture, Radiation pattern of Antennas and Intensity modulation of Laser output through an optical fiber.
15A04712	VLSI & Embedded Systems Laboratory	CO1: Design and draw the internal structure of the various digital ICs
		CO2: Develop VHDL /Verilog source code , perform simulation and obtain the results using synthesizer
		CO3: Learn and understand how to configure the TM4C processor and interfacing the various hardware peripherals
III-II Semester, R15		
15A52301	Managerial Economics and Financial Analysis	CO1: Explain the scope of managerial economics and types of elasticity of demand and measurements of elasticity of demand.
		CO2: Understand the production and cost concepts - normal cost, variable cost and total cost.
		CO3: Explain about markets and new economic environment.
		CO4: Explain the importance of double entry book system in different types of business and the concept of financial accounting with solutions.
		CO5: Explain the importance of Capital and capital budgeting techniques for taking long term decisions in investments.

15A04601	Microprocessors & Microcontrollers	CO1: Illustrate the Concepts of 8086 microprocessor.
		CO2: Develop 8086 Assembly level language programs.
		CO3:Explain the architecture of Advanced MSP430 microcontrollers.
		CO4: Summarize the peripherals of MSP430 Microcontroller.
		CO5: Categorize the Serial Communication Protocols.
15A04602	Electronic Measurements and Instrumentation	CO1: Understand the basic characteristics and principles of meters
		CO2: Analyze and measure the voltages, currents and frequency of a signal using meters.
		CO3: Understand and analyze the principles and functions of signal generators.
		CO4: Understand the measurements and parameters of bridge.
		CO5: Understand the measurements using sensors & transducers
15A04603	Digital Signal Processing	CO1: Classify the discrete time signals and systems.
		CO2: Develop Fast Fourier Transform (FFT) algorithms for faster computation of Discrete Fourier Transform.
		CO3: Design the structures for the realization of discrete time systems.
		CO4: Design the Digital IIR and FIR filters for the given specifications.
		CO5: Explain the fundamentals of multirate digital signal processing.
15A04604	VLSI Design	CO1: Explain about Fabrication process of ICs
		CO2: Develop VLSI circuits as per specifications given.
		CO3: Analyze the design of Arithmetic / logic building Blocks at all levels of Design/Fabrication.
		CO4: Build circuits through various design styles (Semi- Custom, Full Custom)
		CO5: Understand the VHDL Synthesis and Test & Test ability
15A04605	MATLAB Programming	CO1:understand the MATLAB desktop,command window and the graph window
		CO2:Perform simple and complex calculations using MATLAB
		CO3:Carry out numerical computations and analyses
		CO4:ensure that one can competently use the MATLAB

		programming environment
		CO5:understand the tools that are essential in solving engineering problems
15A04607	Microprocessors & Microcontrollers Laboratory	CO1: Execute 8086 assembly language programs for arithmetic,logical and string operations using MASM.
		CO2:Organize an algorithm, the flow diagram, source code and perform the compilation of MSP430 microcontroller embedded C programs using CC studio.
		CO3:Experiment the Embedded C code logic with the necessary hardware connected to MSP430 microcontroller using CC studio.
15A04608	Digital Signal Processing Laboratory	CO1:Find the response of a Linear time invariant discrete time system.
		CO2:Analyze the frequency spectrum of a discrete time signal.
		CO3:Determine the spectrum of a real world signal using Fast Fourier Transform algorithm
		CO4:Implement DSP algorithms using both fixed and floating point processors.
15A52602	Advanced English Language Communication Skills (AELCS) Laboratory (Audit Course	CO1: Understand basics of communication in social and professional circles.
		CO2: Become active participant in learning process
		CO3: Acquire proficiency in spoken English.
		CO4.Speak with clarity and confidence there by enhance employability skills.
III-I Semester, R15		
15A05402	Computer Organization	CO1: Understand the functional units, bus structure in computer system.
		CO2: Identify addressing modes and instruction set.
		CO3: Design the hardwired and micro-programmed control units.
		CO4: Understand pipelined execution and instruction scheduling.
		CO5:Analyse the multi processor system and array processors.
15A04501	Antennas and Wave Propagation	CO1: : Explain the basic principle of different types of antennas.
		CO2: Analyze the different types of antennas of various frequencies.

		CO3: Design some practical antennas such as yagiuda , horn antenna.
		CO4: Determine the radiation pattern, gain of antennas with aid of the measurement setups.
		CO5: Explain different modes of wave propagation.
15A04502	Digital Communicatio n Systems	CO1: Demonstrate digital pulse modulation techniques.
		CO2: Apply line coding and pulse shaping techniques for data transmission.
		CO3: Demonstrate knowledge about inter symbol interference.
		CO4: Analyze digital modulation schemes.
		CO5: Apply channel coding techniques for data transmission.
15A04503	Linear Integrated Circuits and Applications	CO1:Compare the characteristics of various differential amplifier configurations
		CO2: Summariuze the basic building blocks of linear integrated circuits and its characteristics.
		CO3: Analyze and design the linear, non-linear and applications of operational amplifiers.
		CO4: Understand the specialized applications of operational amplifiers.
		CO5: Classify and compare the advantages among ADCs and DACs.
15A04504	Digital System Design	CO1: Designing CMOS logic families, Bipolar families,& TTL families
		CO2:using computer aided design tools to model, simulate, verify ,analyze,& synthesize complex digital logic circuits
		CO3:designing and prototype with standard cell technology and programmable logics efficiently
		CO4:efficiently designing any digital system using basic structure IC's
		CO5:programming sequential logic designing circuits, understand their working, evaluate their results
15A04506	MEMS & Microsystems	CO1: Explain the MEMS materials.
		CO2: Classify the design technology for MEMS.
		CO3: Illustrate the design concepts of MEMS Micro sensors.
		CO4: Illustrate the design concepts of MEMS Accelerometer.
		CO5: Explain the concepts of Carbon Nanotubes and Bio-MEMS.
15A04507	IC	CO1: Understand the application of negative feedback in

	Applications Laboratory	designing amplifiers
		CO2: Understand the advantages and disadvantages of using integrators and differentiators
		CO3: Design a Square and Triangular wave generator/oscillator,PLL using a general purpose OP-Amp and a comparator
		CO4: Design a high-efficient DC-DC, Low Dropout regulator converter using a general purpose OP-Amp and a comparator
15A04508	Digital Communicatio n Systems Laboratory	CO1: experiencing real time behaviour of different digital modulation schemes.
		CO2: understanding basic theories of digital communication systems in practical and design them.
		CO3: Analyze digital modulation techniques by using MATLAB tools.
15A99501	Audit course – Social Values & Ethics	CO 1: Develop awareness on ethics, human values & obligations related to Self, Family, Society and State. .
		CO 2 :Know the role of youth in NCC,NSS, RTI, Human Rights etc.
		CO 3: As a social experimentalist they can ensure less hazards & can find out engineering solutions from the ethical platform.
		CO 4: Students can understand the gender sensitization, gender equality, decline sex ratio, domestic violence.
		CO 5: Understand the benefits of physical exercises sports, yoga.
II B. Tech – II sem		
15A54402	Mathematics-IV	CO1: Explain the concepts of special functions.
		CO2: Solve Bessel's functions & apply its properties.
		CO3: Identify and solve the problems using Bilinear transforms.
		CO4: Evaluate complex integration.
		CO5: Use residue theorem to evaluate improper integrals.
15A04401	Electronics Circuits Analysis	CO1: Analyze and design feedback amplifiers, oscillator.
		CO2: Analyze the frequency response of the amplifiers at low and high frequencies.
		CO3: Analyze the multistage amplifiers using FET, Differential amplifier using BJT.
		CO4: compare and analyze the efficiencies of power amplifiers

		CO5: Analyze and design the tuned amplifiers.
15A04402	Analog Communicatio n Systems	CO1: Explain blocks used for building communication systems.
		CO2: Analyze the analog modulated and demodulated systems.
		CO3: Compare noise performance of receivers.
		CO4: Analyze the different characteristics of a receiver.
		CO5: Demonstrate the fundamental Concepts of information and capacity.
15A04403	Electromagnet ic Theory and Transmission Lines	CO1: Explain the basic concept of electrostatics and magneto statics.
		CO2: Apply Maxwell's equations to some important problems of electromagnetic.
		CO3: Examine the time varying Maxwell's equations.
		CO4: Explain the EM wave propagation for conducting and non conducting medium.
		CO5: Determine the characteristics of lossy and lossless transmission lines.
15A05201	Data Structures	CO1:Explain linked lists and its applications.
		CO2: Apply stack and queues in the related applications.
		CO3: Analyze trees and graphs.
		CO4: Evaluate different sorting techniques.
		CO5: CO5: Explain various searching methods.
15A02303	Control System Engineering	CO1: Understand the basic of control systems.Evaluate the effective transfer function of a system from input to output using (i) block diagram reduction techniques (ii) Mason's gain formula.
		CO2: Determine the time -domain responses of first and Second-order systems for different test input signals, time domain specifications.
		CO3: Understand the concept of Routh's stability criterion and Root locus.
		CO4: Determine the frequency response analysis of various systems.
		CO5: Derive state space model of a given physical system and solve the state equation.
15A04404	Electronic Circuit Analysis Laboratory	CO1: Design and calculate the voltage and current gains of the small signal amplifiers
		CO2: Design and calculate the voltage and current gains of the

		feedback and power amplifiers.
		CO3:Design and observe the oscillations produced by various oscillators
15A04405	Analog Communication System Laboratory	CO1: Analyze the practical aspects of various analog modulation schemes.
		CO2: Learn the several aspects of various Pulse analog modulation schemes
		CO3:Evaluate the various measures that improve receiver performance.
II B Tech I Sem		
15A54301	Mathematics-III	CO1:Explain the concepts of matrices and its applications
		CO2:Solve algebraic & transcendental equations using appropriate numerical methods
		CO3:Analyze a problem using different interpolation formulae
		CO4:Construct various types of curves using different numerical techniques
		CO5:Find numerical solutions of ordinary differential equations
15A04301	Electronics Devices and Circuits	CO1: Illustrate semiconductor physics of the intrinsic and extrinsic semiconductors.
		CO2: Explain the operating principles of Diodes, special purpose electronic devices.
		CO3: Analyze the characteristics of BJT, FET, MOSFET.
		CO4: Design and analyze the DC bias circuitry of BJT and FET.
		CO5: Compare and analyze the small signal amplifier circuits using BJT and FET.
15A04302	Switching Theory and Logic Design	CO1: Apply knowledge of Number systems, codes and logic gates to solve typical problems on mathematical logic applications
		CO2: Minimize the given switching function in SOP and POS forms using K-Maps.
		CO3: Design different types of combinational logic circuits using various logic gates
		CO4: Analyze and design different types of Synchronous and Asynchronous logic gates
		CO5: Design PLDs and Computer Memories
15A04303	Signals and	CO1: Analyze the characteristics of continuous time and discrete time signals using the linear algebra concepts and Fourier analysis.

	Systems	
		CO2: Determine the Continuous Time Fourier Transform for different types of signals and analyze the effects of sampling process.
		CO3: Classify systems based on their properties and analyze the LTI systems using impulse response.
		CO4: Apply Discrete Time Fourier Transform to analyze the discrete time signals and systems.
		CO5: Apply the Laplace transform and Z transform for analyze of continuous time and discrete time signals and systems
15A04304	Probability Theory and Stochastic Processes	CO1: Explain the Simple probabilities using an appropriate sample space.
		CO2: Define density and distribution functions.
		CO3: Determine Mean, Variance and covariance functions for random processes.
		CO4: Explain the temporal Characteristics of the random process.
		CO5: Analyze linear system and apply temporal and spectral properties to LTI systems.
15A02303	Electrical Technology	CO1: Describe the structure of D.C Generator.
		CO2: Understand basic concept of D.C Motors
		CO3: Understand the basic principles of transformers and its applications.
		CO4: Describe the operation induction motors to real world problems and its applications.
		CO5: Learn synchronous motors and its applications in real time.
15A04305	Electronics Devices and Circuits Lab	CO1: Identify, Specify, Test the passive components as well as active devices
		CO2: Plot V_I characteristics of all semiconductor devices
		CO3: Design the DC bias circuitry of BJT
		CO4: Explain and implement the concept of the small signal amplifier
15A02307	Electrical Technology and Basic simulation	CO1: Analyze the signals, Understand Basic Operation on matrices, Apply Gibbs Phenomenon and Random process for stationary in the wide sense.

	Lab	
		CO2: Analyze the analysis of Fourier Transform, Laplace Transform and Z-Transform
		CO3: Provide an overview of signal transmission through linear systems convolution and auto correlation of signals, sampling, Filters and random process
		CO4: Acquire hands on experience of conducting various tests on dc machines and obtaining their performance indices using standard analytical as well as graphical methods.
		CO5: Acquire hands on experience of conducting various tests on transformers and obtaining their performance indices using standard analytical as well as graphical methods.