AVANTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY
(Approved by AICTE, Recg. By Govt. of T.S & Affiliated to JNTUH, Hyderabad)
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Electronics and Communication Engineering I & II SEM Course Outcomes For R22 regulation

S.no	Year/Sem	Course Name	Course Outcomes
1	II-I	ANALOG CIRCUITS	CO1: Design the amplifiers with various biasing techniques
			CO2: Design single stage amplifiers using BJT and FET
			CO3:Design multistage amplifiers and understand the concepts of High Frequency Analysis of BJT.
			CO4:Utilize the Concepts of negative feedback to improve the stability of amplifiers and positive feedback to sustained oscillations.
2	II-I	NETWORK ANALYSIS AND SYNTHESIS	CO1: Gain the knowledge on basic RLC circuits behavior.
			CO2; Analyze the Steady state and transient analysis of RLC Circuits
			CO3: Know the characteristics of two port network parameters
			CO4: Analyse the Design aspect of various filters and attenuators
3	II-I	DIGITAL LOGIC DESIGN	CO1: Understand the numerical information in different forms and Boolean Algebra theorems
			CO2: Postulates of Boolean algebra and to minimize combinational functions
			CO3: Design and analyze combinational and sequential circuits
			CO4: Known about the logic families and realization of logic gates.
4	II-I	SIGNALS AND SYSTEMS	CO1: Differentiate various signal functions
			CO2:Represent any arbitrary signal in time and frequency domain.
			CO3:Understand the characteristics of linear time invariant systems.
			CO4:Analyze the signals with different transform technique
5	II-I	PROBABILITY THEORY STOCHASTIC PROCESSES	CO1: Understand the concepts of Random Process and its Characteristics
			CO2: Understand the response of linear time Invariant system for a Random Processes.
			CO3: Determine the Spectral and temporal characteristics of Random Signals
			CO4: Understand the concepts of Noise in Communication systems.
6	II-I	ANALOG CIRCUITS LAB	CO1:Ability to analyze PN junctions in semiconductor devices under various conditions.
			CO2;Ability to design and analyze simple rectifiers and voltage regulators using diodes.
			CO3:Ability to describe the behavior of special purpose diodes.
			CO4:Ability to design and analyze simple BJT and MOSFET circuits.
7	II-I	DIGITAL LOGIC DESIGN LAB	CO1: Apply the concept of Boolean algebra to verify the truth table ofvarious expressions using logic gates in Hardware Description Language.
			CO2 :Make use of dataflow, structural and behavioral modeling styles of HDL for simulating the combinational logic circuits.
			CO3:Analyze the SR flip flop, JK flip flop, D flip flop, T flip flops forfunctional simulation and timing analysis.
			CO4:Build the universal shift registers, counters using the flip flops
			CO5:Examine a finite state machine for detection of sequence.
			CO6:Design the real time applications like traffic light controller, chess clock controller FSM, elevator operations using FPGA kit.
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8	II-I	BASIC SIMULATION LAB	CO1:Acquainted with MATLAB commands, functions and programming
			CO2:Generate various signals and sequences in MATLAB and perform operations on them.
			CO3:Determine the Convolution and Correlation between Signals and Sequences.
			CO4:Verify the properties of a given Continuous/Discrete System and Sampling theorem
			CO5:Determine the Laplace and Fourier Transform of the given signal.
			CO6: Determine LTI system response.

9	II-I	CONSTITUTION OF INDIA	CO1:To realise the significance of constitution of India to students from all walks of life and help them to understand the basic concepts of Indian constitution.
			CO2:To identify the importance of fundamental rights aswell as fundamental duties
			CO3:To understand the functioning of Union, State and Local Governments in Indian federal system
			CO4:To learn procedure and effects of emergency, composition and activities of election commission and amendment procedure
10	II-II	NUMERICAL METHODS AND COMPLEX VARIABLES	CO1: Use the Laplace transforms techniques for solving ODE's
			CO2:Estimate the value for the given data using interpolation
			CO3:Estimate the value for the given data using interpolation
			CO4: CO4:Find the numerical solutions for a given ODE's
			CO5:Analyze the complex function with reference to their analyticity, integration using Cauchy's
			CO6:integral and residue theorems Taylor's and Laurent's series expansions of complex function
11	II-II	ELECTROMAGTIC FIELDS AND TRANSMISSION LINES	CO1:Get the knowledge of Basic Laws, Concepts and proofs related to Electrostatic Fields and Magnetostatic Fields.
			CO2:Distinguish between the static and time-varying fields, establish the corresponding sets of Maxwell's Equations and Boundary Conditions
			CO3:Analyze the Wave Equations for good conductors, good dielectrics and evaluate the UPW Characteristics for several practical media of interest.
			CO4:To analyze completely the rectangular waveguides, their mode characteristics, and design waveguides for solving practical problems
12	II-II	ANALOG AND DIGITAL COMMUNICATION	CO1:Analyze and design of various continuous wave and angle modulation and demodulation techniques
			CO2:Understand the effect of noise present in continuous wave and angle modulation techniques.
			CO3:Attain the knowledge about AM , FM Transmitters and Receivers
			CO4:Analyze and design the various Pulse Modulation Techniques
			CO5:Understand the concepts of Digital Modulation Techniques and Baseband transmission.
13	II-II	TRONIC CIRCUIT ANA	CO1:Design the multistage amplifiers and understand the concepts of High Frequency Analysis of Transistors.
			CO2:Utilize the Concepts of negative feedback to improve the stability of amplifiers and positive feedback to generate sustained oscillations
			CO3:Design and realize different classes of Power Amplifiers and tuned amplifiers useable for audio and Radio applications
			CO4:Design Multivibrators and sweep circuits for various applications
14	II-II	LINEAR AND DIGITAL IC APPLICATIONS	CO1:A thorough understanding of operational amplifiers with linear integrated circuits
			CO2:Attain the knowledge of functional diagrams and applications of IC 555 and IC 565
			CO3:Acquire the knowledge about the Data converters
15	II-II	ANALOG AND DIGITAL COMMUNICATION LAB	CO1: Design and implement various Analog modulation and demodulation Techniques and observe the time and frequency domain characteristics
			CO2: Design and implement various Pulse modulation and demodulation Techniques and observe the time and frequency domain characteristics
			CO3: Apply different types of Sampling with various Sampling rates and duty Cycles
			CO4:Design and implement various Digital modulation and demodulation Techniques and observe the waveforms of these modulated Signals practically
16	II-II	LINEAR AND DIGITAL IC APPLICATION LAB	CO1:Design and implementation of various analog circuits using 741 Ics
			CO2:Design and implementation of various Multivibrators using 555 timer.
			CO3:Design and implement various circuits using digital Ics
			CO4:Design and implement ADC, DAC and voltage regulators.

17	II-II	ELECTRONIC CIRCUIT ANALYSIS LAB	CO1:The ability to analyze and design single and multistage amplifiers at low, mid and high frequencies.
			CO2: Designing and analyzing the transistor at high frequencies.
			CO3:Determine the efficiencies of power amplifiers
			CO4:Designing the Oscillators using transistors
			CO5:Determine Frequency response and design of tuned amplifiers.
			CO6:Able to Analyze all the circuits using simulation software and Hardware.
18	II-II	GENDER SENSITIZATION LAB	CO1:Students will have developed a better understanding of important issues related to gender in contemporary India.
			CO2:Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
			CO3:Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
			CO4:Students will acquire insight into the gendered division of labour and its relation to politics and economics
			CO5:Men and women students and professionals will be better equipped to work and live together as equals.
Course Outcomes For R18 regulation			
19	III-I	MICROPROCESSORS AND MICRO CONTROLLERS	CO1:Understands the internal architecture, organization and assembly language programming of 8086 processors.
			CO2:Understands the internal architecture, organization and assembly language programming of 8051/controllers
			CO3:Understands the interfacing techniques to 8086 and 8051 based systems
			CO4:Understands the internal architecture of ARM processors and basic concepts of advanced ARM processors.
20	III-I	DATA COMMUNICATIONS AND NETWORKS	CO1:Know the Categories and functions of various Data communication Networks
			CO2:Design and analyze various error detection techniques.
			CO3:Demonstrate the mechanism of routing the data in network layer
			CO4:Know the significance of various Flow control and Congestion control Mechanisms
			CO5:Know the Functioning of various Application layer Protocols.
21	III-I	CONTRPOL SYSTEMS	CO1:Understand the modeling of linear-time-invariant systems using transfer function and statespace representations.
			CO2:Understand the concept of stability and its assessment for linear-time invariant systems.
			CO3:Design simple feedback controllers.
22	III-I	BUSINESS ECONIOMICS AND FINANCIAL ANALYSIS	CO1:The students will understand the various Forms of Business and the impact of economic variables on the Business.
			CO2: The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt.
			CO3:The Students can study the firm's financial position by analysing the Financial Statements of a Company
23	III-I	COMPUTER ORGANIZATION AND OPERATING SYSTEMS	CO1:Able to visualize the organization of different blocks in a computer.
			CO2: Able to use micro-level operations to control different units in a computer.
			CO3:TAble to use Operating systems in a computer.
24	III-I	ERROR CORRECTING CODES	CO1:Able to transmit and store reliable data and detect errors in data through coding.
			CO2: Able to understand the designing of various codes like block codes, cyclic codes, convolution codes, turbo codes and space codes

25	III-I	ELECTRONIC MEASUREMENT AND INSTRUMENTATION	CO1:Measure electrical parameters with different meters and understand the basic definition of measuring parameters.
			CO2: Use various types of signal generators, signal analyzers for generating and analyzing various real-time signals.
			CO3:Operate an Oscilloscope to measure various signals.
			CO4: Measure various physical parameters by appropriately selecting the transducers.
26	III-I	MICROPROCESSORS AND MICRO CONTROLLERS LAB	CO1:The student will learn the internal organization of popular 8086/8051 microprocessors/microcontrollers.
			CO2:The student will learn hardware and software interaction and integration.
			CO3:To apply the concepts in the design of microprocessor/microcontroller based systems in real time applications
27	III-I	DATA COMMUNICATIONS AND NETWORKS LAB	CO1:Understand the structure and organization of computer networks; including the division into network layers, role of each layer, and relationships between the layers.
			CO2:Understand the basic concepts of application layer protocol design; including client/server models, peer to peer models, and network naming.
			CO3:In depth understanding of transport layer concepts and protocol design; including connection oriented and connection-less models, techniques to provide reliable data delivery and algorithms for congestion control and flow control.
28	III-I	ADVANCED COMMUNICATION SKILLS LAB	CO1:To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts
			CO2:Further, they would be required to communicate their ideas relevantly and coherently in writing.
			CO3:To prepare all the students for their placements
29	III-I	INTELLECTUAL PROPERTY RIGHTS	CO1:It allows students how to prepare and protect the Inventions , start up ideas and rights of patents and copy rights etc.,
			CO2:Students get the knowledge on Trademarks and Trade Secrets.
			CO3This subject brings awareness to the students on the various types of Unfair Competition and the Students gets well versed with exposure to licensing and transfer of Copyrights and Patents
			CO4:Student gets. Awareness of Cyber laws and Cyber Crime, to protect the data from Cyber crime.
			CO5:Summarize the Intellectual property rights globally and exposure to the emerging trends In IPR.
30	III-II	ANTENSAS AND PROPAGATION	CO1:Characterize the antennas based on frequency, configure the geometry and establish the radiation patterns of VHF, UHF and Microwave antennas and also antenna arrays
			CO2:Specify the requirements for microwave measurements and arrange a setup to carry out the antenna far zone pattern and gain measurements in the laboratory
			CO3:Classify the different wave propagation mechanisms, determine the characteristic features of different wave propagations, and estimate the parameters involved.
31	III-II	DIGITAL SIGNAL PROCESSING	CO1:Understand the LTI system characteristics and Multirate signal processing.
			CO2:Understand the inter-relationship between DFT and various transforms
			CO3:Design a digital filter for a given specification.
			CO4:Understand the significance of various filter structures and effects of round off errors.

32	III-II	VLSI DESIGN	CO1:Acquire qualitative knowledge about the fabrication process of integrated circuits using MOS transistors
			CO2:Draw the layout of any logic circuit which helps to understand and estimate parasitic effect of any logic circuit
			CO3:Design building blocks of data path systems, memories and simple logic circuits using PLA, PAL, FPGA and CPLD.
			CO4:Understand different types of faults that can occur in a system and learn the concept of testing and adding extra hardware to improve testability of system.
33	III-II	OBJECT ORIENTED PROGRAMMIN G THROUGH JAVA	CO1:Develop Applications for Range of Problems Using Object-Oriented Programming Techniques
			CO2:Design Simple Graphical User Interface Applications.
34	III-II	MOBILE COMMUNICATIONS AND NETWORKS	CO1:Known the evolution of cellular and mobile communication system.
			CO2:The student will be able to understand Co-Channel and Non-Co-Channel interferences.
			CO3:Understand impairments due to multipath fading channel and how to overcome the different fading effects.
			CO4:. Familiar with cell coverage for signal and traffic, diversity, techniques, frequency management, Channel assignment and types of handoff
			CO5: Know the difference between cellular and Adhoc Networks and design goals of MAC Layer protocol.
35	III-II	EMBEDDED SYSTEM DESIGN	CO1:To understand the selection procedure of Processors in the embedded domain
			CO2:Design Procedure for Embedded Firmware.
			CO3:To visualize the role of Real time Operating Systems in Embedded Systems.
			CO4:To evaluate the Correlation between task synchronization and latency issues
36	III-II	DIGITAL SIGNAL PROCESSING LAB	CO1:Apply discrete Fourier transforms for spectral analysis of discretesignals.
			CO2:Apply fast Fourier transform algorithms for reducing computationalcomplexity of discrete Fourier transform
			CO3:Compare IIR digital filter and FIR Digital filters using differentmethods.
			CO4:Analyze the Goertzel algorithm for the generation and detection of dual-tone multi-frequency (DTMF) signaling.
			CO5:Apply multi-rate signal processing methods such as decimation and interpolation for interfacing the digital systems with different sampling rates.
			CO6: Apply the digital signal processing algorithms for designing real time embedded signal processing applications.
37	III-II	e-CAD LAB	CO1:Design entry and simulation of combinational &sequential circuits and functional verification
			CO2:Synthesis, p&r and post p&r simulation for combinational and sequential circuits.
			CO3:Implementation of the combinational &sequential circuits on FPGA hardware
			CO4:Write verilog and VHDL code for different circuits and understanding design styles.

38	III-II	SCRIPTING LANGUAGES LAB	CO1:Ability to understand the differences between Scripting languages and programming languages
			CO2:Able to gain some fluency programming in Ruby, Perl, TCL
39	III-II	ENVIRONMENTAL SCIENCE	CO1:Understanding the importance of ecological balance for sustainable development
			CO2:Understanding the impacts of developmental activities and mitigation measures
			CO3:Understanding the environmental policies and regulations
40	IV-I	MICROWAVE AND OPTICAL COMMUNICATIONS	CO1:Known power generation at microwave frequencies and derive the performance characteristics
			CO2:realize the need for solid state microwave sources and understand the principles of solid state devices
			CO3:distinguish between the different types of waveguide and ferrite components, and select proper components for engineering applications
			CO4:understand the utility of S-parameters in microwave component design and learn the measurement procedure of various microwave parameters
			CO5:Uunderstand the mechanism of light propagation through Optical Fibres.
41	IV-I	ARTIFICIAL NEURAL NETWORKS (PE-III)	CO1:Understand the similarity of Biological networks and Neural networks
			CO2:Perform the training of neural networks using various learning rules.
			CO3:Understanding the concepts of forward and backward propagations.
			CO4:Understand and Construct the Hopfield models.
42	IV-I	SCRIPTING LANGUAGES (PE-III)	CO1:Known about basics of Linux and Linux Networking
			CO2:Use Linux environment and write programs for automation
			CO3:Understand the concepts of Scripting languages
			CO4:Create and run scripts using PERL/TCl/Python.
43	IV-I	DIGITAL IMAGE PROCESSING (PE-III)	CO1:Explore the fundamental relations between pixels and utility of 2-D transforms in image processer
			CO2:Understand the enhancement, segmentation and restoration processes on an image.
			CO3:Implement the various Morphological operations on an image
			CO4:Understand the need of compression and evaluation of basic compression algorithms.
44	IV-I	BIOMEDICAL INSTRUMENTATION (PE-IV)	CO1:Understand biosystems and medical systems from an engineering perspective
			CO2: Identify the techniques to acquire record and primarily understand physiological activity of the human body through cell potential, ECG, EEG, BP and blood flow measurement and EMG.
			CO3:Understand the working of various medical instruments and critical care equipment
			CO4: Know the imaging techniques including CT,PET, SPECT and MRI used in diagnosis of various medical conditions

45	IV-I	DATABASE MANAGEMENT SYSTEMS (PE-IV)	CO1:Gain knowledge of fundamentals of DBMS, database design and normal forms
			CO2: Master the basics of SQL for retrieval and management of data
			CO3:Be acquainted with the basics of transaction processing and concurrency control.
			CO4: Familiarity with database storage structures and access techniques
46	IV-I	NETWORK SECURITY AND CRYPTOGRAPHY (PE-IV)	CO1:Describe network security fundamental concepts and principles
			CO2: Master the basics of SQL for retrieval and management of data
			CO3:Analyze key agreement algorithms to identify their weaknesses
			CO4:Identify and assess different types of threats, malware, spyware, viruses, vulnerabilities
47	IV-I	PROFESSIONAL PRACTISE , LAW AND ETHICS	CO1:The students will understand the importance of professional practice, Law and Ethics in their personal lives and professional careers
			CO2: Master the basics of SQL for retrieval and management of data
48	IV-I	MICROWAVE AND OPTICAL COMMUNICATIONS LAB	CO1:Known power generation atmicrowave frequencies andderive the performance characteristics.
			CO2: realize the need for solid state microwave sources and understand the principles of solid state devices
			CO3:distinguish between the different types of waveguide andferrite components, andselect proper components for engineering applications
			CO4: understand the utility of S-parameters in microwave component design and learn the measurement procedure of various microwave parameters
			CO5:Uunderstand the mechanism of light propagation through Optical Fibres.
49	IV-II	SATELLITE COMMUNICATIONS (PE-V)	CO1:Understand basic concepts and frequency allocations for satellite communication, orbital mechanics and launch vehicles.
			CO2: Envision the satellite sub systems and design satellite links for specified C/N.
			CO3:Understand the various multiple access techniques for satellite communication systems and earth station technologies.
			CO4: Known the concepts of LEO, GEO Stationary Satellite Systems and satellite navigation
50	IV-II	RADAR SYSTEMS(PE-V)	CO1:Derive the complete radar range equation
			CO2:Understand the need and functioning of CW, FM-CW and MTI radars
			CO3:Known various Tracking methods.
			CO4: Derive the matched filter response characteristics for radar receivers.
51	IV-II	WIRELESS SENSOR NETWORKS(PE-V)	CO1:Analyze and compare various architectures of Wireless Sensor Networks
			CO2:Understand Design issues and challenges in wireless sensor networks
			CO3:Analyze and compare various data gathering and data dissemination methods.
			CO4: Design, Simulate and Compare the performance of various routing and MAC protocol
52	IV-II	SYSTEM ON CHIP ARCHITECTURE (PE-V)	CO1:Expected to understand SOC Architectural features
			CO2:To acquire the knowledge on processor selection criteria and limitations
			CO3:To acquires the knowledge of memory architectures on SOC.
			CO4: To understands the interconnection strategies and their customization on SOC
53	IV-II	TEST AND TESTABILITY (PE-VI)	CO1:To acquire the knowledge of fundamental concepts in fault and fault diagnosis
			CO2:Test pattern generation using LFSR and CA
			CO3: Design for testability rules and techniques for combinational circuits
			CO4: Introducing scan architectures
54	IV-II	LOW POWER VLSI DESIGN (PE-VI)	CO1:Understand the need of Low power circuit design.
			CO2:Attain the knowledge of architectural approaches.
			CO3:Analyze and design Low-Voltage Low-Power combinational circuits.
			CO4: Known the design of Low-Voltage Low-Power Memories

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M.TECH VLSI I & II SEM Course Outcomes For R22 regulation

S.no	Year/Sem	Course Name	Course Outcomes
1	I-I	DIGITAL SYSTEM DESIGN WITH FPGA	CO1 :To exposes the design approaches using FPGAs
			CO2:To provide in depth understanding of Fault models.
			CO3:To understands test pattern generation techniques for fault detection.
			C04:To design fault diagnosis in sequential circuits.
			CO5:To provide understanding in the design of flow using case studies.
2	I-I	CMOS ANALOG IC DESIGN	CO1:Design basic building blocks of CMOS analog ICs.
			CO2:Carry out the design of single and two stage operational amplifiers and voltage references.
			CO3:Determine the device dimensions of each MOSFETs involved
			CO4:Design various amplifiers like differential, current and operational amplifiers
3	I-I	PATTERN RECOGNITION AND MACHINE LEARNING	CO1:Familiar the basics of pattern classes and functionality
			CO2:Construct the various linear models.
			CO3:Use the different kernel methods.
			CO4:Design the Markov and Mixed models.
4	I-I	CMOS MIXED SIGNAL DESIGN	CO1:Designing CMOS analog circuits to achieve performance specifications.
			CO2:Analyzing CMOS based switched capacitor circuits.
			CO3:Designing data converters and know how to use these in specific applications
			CO4:Design a mixed-signal circuits with understanding design flow.
5	I-I	MEMORY TECHNOLOGIES	CO1:Select architecture and design semiconductor memory circuits and subsystems
			CO2:Identify various fault models, modes and mechanisms in semiconductor memories and their testing procedures
			CO3:Know, how of the state-of-the-art memory chip design
6	I-I	ARM MICROCONTROLLERS	CO1:Explore the selection criteria of ARM processors by understanding the functional level trade off issues.
			CO2:Explore the ARM development towards the functional capabilities.
			CO3:Work with ASM level program using the instruction set.
			CO4:Programming the ARM Cortex M.
7	I-I	EMBEDDED REAL TIME OPERATING SYSTEMS	CO1:Be able to explain real-time concepts such as preemptive multitasking, task priorities, priority inversions, mutual exclusion, context switching, and synchronization, interrupt latency and response time, and semaphores
			CO2:Able describe how a real-time operating system kernel is implemented
			CO3:Explain how the real-time operating system implements time management.
			CO4:Be able to work with real time operating systems like RT Linux, Vx Works, MicroC /OS-II, Tiny OS
8		CMOS ANALOG IC DESIGN LAB	CO1:Design analog Circuit using CMOS.
			CO2:Use EDA tools like Cadence, Mentor Graphics and other opensource software tools like Ngspice
9	I-I	RESEARCH METHODOLOGY AND IPR	CO1:Understand research problem formulation.
			CO2:Analyze research related information
			CO3:Follow research ethics
			CO4:Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
			CO5:Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular

10	I-II	VLSI ADVANCED PHYSICAL DESIGN	CO1:Design power mesh for given specifications, analyze IR drop and EM issues and fix them.
			CO2:Implement the low power intent of the design using current industry standard UPF
			CO3:Verify whether the design meets the power intent in UPF
			CO4:Perform physical verification both at LVS & DRC level and fix all issues.
11	I-II	SYSTEM VERILOG TEST BENCHES USING UVM	CO1:Implement test bench programs using system Verilog
			CO2: Develop random stimulus and SVAs using system Verilog
			CO3:Develop a UVM testbench with all its features
12	I-II	IOT ARCHITECTURES AND SYSTEM DESIGN	CO1:Integrate the sensors and actuator depending on the applications
			CO2:Interface the IoT and M2M with value chains
			CO3:Write Python programming for Arduino, Raspberry Pi devices
			C04: Design IoT based systems such as Agricultural IoT, Vehicular IoT etc.,
13	I-II	SOC DESIGN	CO1:Identify and formulate a given problem in the framework of SoC based design approaches
			CO2:Design SoC based system for engineering applications
			CO3:Realize impact of SoC on electronic design philosophy and Macro-electronics thereby incline towards entrepreneurship & skill development.
14	I-II	DESIGN FOR TESTABILITY	CO1:Acquire verification knowledge and test evaluation
			CO2:Design for testability rules and techniques.
			CO3: Utilize the scan architectures for different digital circuits
			CO4:Acquire the knowledge of design of built-in-self test.
15	I-II	DEVICE MODELLING	CO1:Develop a functional relationship among the terminal electrical variables of the device that is to be modeled.
			CO2:Describe the behavior of all components successfully
			CO3: Perform the simulation and analyze the VLSI circuits
			CO4:Use the FinFET for various applications
16	I-II	RF IC DESIGN	CO1:Analyze the behavior of high frequency components.
			CO2:Calculate the scattering parameters of various RF components and analyze the various filter parameters.
			CO3:Implement component modelling and biasing networks.
			CO4:Design the various RF filters, amplifiers, oscillators and mixers.
17	I-II	HARDWARE AND SOFTWARE CO-DESIGN	CO1:Acquire the knowledge on various models of Co-design.
			CO2:Explore the interrelationship between Hardware and software in a embedded system
			CO3:Acquire the knowledge of firmware development process and tools during Co-design
			CO4: Implement validation methods and adaptability.
18	II-I	ADVANCED COMPUTER ARCHITECTURE	CO1:Familiarize the instruction set, memory addressing of Computer
			CO2:Handle the issues in pipelining and parallelism
			CO3:Familiarize the practical issues in inter network
19	II-I	HARDWARE SECURITY	CO1:Design a more secure systems by knowing countermeasures of various hardware attacks
			CO2:Experiment the impressive efficiency of hardware attacks
			C03:Monitor computation time or power consumption to reveal secrets
			CO4:Design a secure systems which lead to privilege escalation and compromise
20	II-I	NANOMATERIALS AND NANOTECHNOLOGY	CO1:Formulate new engineering solutions for current problems and competing technologies for future applications
			CO2:Made inter disciplinary projects applicable to wide areas by clearing and fixing the boundaries in system development.
			CO3:Gather detailed knowledge of the operation of fabrication and characterization devices to achieve precisely designed systems