Sarvasiddhanta Education Society's
Swaminarayan Siddhanta Institute of Technology
Affiliated to Rashtrasant Tukadoji Maharaj Nagpur University
Nagpur-Katol Highway Road, Khapri (Kothe),
Tal: Kalmeshwar, Nagpur, Maharastra-441501
Department of Electronics and Telecommunication Engineering

COURSE OUTCOMES

3rd Semester:

MATHEMATICS III	CO1: Apply Laplace Transform to solve ordinary differential equations, Integral equations and Integral- differential Equations. CO2: Apply Fourier series in the analysis of periodic functions in terms sine and cosine encountered in engineering problems and Fourier Transform to solve integral equations. CO3: Learn the concept of differentiating, integrating and expanding of analytic functions in complex numbers and their applications such as evaluation of integrals of complex functions. CO4: Solve partial differential equations of first order, higher order with constant coefficients and of second order using method of separation of variables. CO5: Analyze real world scenarios to recognize when matrices are appropriate, formulate problems about the scenarios, creatively model these scenarios in order to solve the problems using multiple approaches. CO6: Understand the impact of scientific and engineering solutions in a global and societal context. CO7: Create the groundwork for post-graduate courses, specialized study, and research in mathematics.
COMPONENTS FOR ELECTRONIC CIRCUIT DESIGN	CO1: Understand the principles of semiconductor physics CO2: Understand the principles of semiconductor diode. CO3: Understand and analyze the mathematical model of transistors. CO4: Understand and analyze the mathematical model of unipolar transistors. CO5: Understand the process of Integrated Circuit Fabrication
DIGITAL SYSTEM DESIGN	CO1: Demonstrate the knowledge of: Logic gates, Boolean algebra including algebraic manipulation/simplification and Application of De Morgan's Theorem, Karnaugh map reduction method. CO2: construct basic combinational circuits and verify their functionalities. CO3: Illustrate and apply the knowledge of different flip flops to build sequential digital circuits. CO4: Interpret different logic families and their characteristics.

	CO5: Demonstrate and apply programming proficiency using the various addressing modes and instructions of the target microprocessor
NETWORK THEORY	CO1: Apply mesh and node voltage method to model and analyze electrical circuits. CO2: Apply network theorems for the analysis of networks. CO3: Obtain the transient and steady-state response of electrical circuits. CO4: Synthesize waveforms and apply Laplace transforms to analyze networks. CO5: Evaluate different Network Functions and Analyze two port network behaviour
SIGNALS AND SYSTEMS	CO1: Classify different types of signals and systems CO2: Illustrate the concept of Linear Time Invariant (LTI) system and its properties. CO3: Analyze continuous time periodic and aperiodic signals. CO4: Analyze continuous time systems using Laplace Transform. CO5: Analyze DT signals and systems in frequency domain using Fourier Transform.
MEASUREMENTS AND INSTRUMENTATION	CO1: Select and use precise/accurate instrument for measurement of various electrical Parameters and to Understand its technical specifications. CO2: Identify and minimize errors in electrical/electronic measurement. CO3: Select suitable transducer for measurement of physical parameters. CO4: Interpret the data using statistical analysis. CO5: Understand modern trends in data acquisition systems
COMPONENTS FOR ELECTRONIC CIRCUIT DESIGN LAB	CO1: The students will get the basic concepts of different semiconductor components. CO2: They will be able to understand the use of semiconductor devices in different electronic circuits.

	CO3: They will be able to calculate different performance parameters of transistors. CO4: They will be able to plot and study the characteristics of semiconductor devices.
DIGITAL SYSTEM DESIGN LAB	CO1: Demonstrate the different Boolean Laws & basics of K-map to realize combinational & sequential circuits. CO2: Identify the various digital ICs & understand their operation. CO3: Describe the operation & timing constraints for latches, registers, different sequential circuits. CO4: Solve basic binary math operations using microprocessor & explain the internal architecture & its operation within the area of manufacturing & performance. CO5: Select programming strategies & proper mnemonics & run their program on the training boards.
ELECTRONICS WORKSHOP I LAB	CO1: Get the Basic Concepts of Different Semiconductor Components with Their Usage Physically as Per Their Types CO2: Use of Semiconductor Devices in Different Electronic Circuits and Projects. CO3: Calculate Different Performance Parameters of Active and Passive Devices and their Datasheets. CO4: Plot and Study the Characteristics of Semiconductor Devices.

4th Semester:

SUBJECT	COURSE OUTCOME
MICROCONTROLLER AND APPLICATIONS	C01: Demonstrate the programming model of various microcontrollers. C02: Design and implement 8051 microcontroller-based systems for various applications C03: Illustrate & program AVR / RISC microcontrollers in Integrated Development environment. C04: Design and implement advanced processor/controllers-based systems for various applications C05: Design and develop Arduino based embedded system applications.

MICROCONTROLLER AND APPLICATIONS LAB	CO1: Demonstrate the concept of Assembly languages and higher-level language programming. CO2: Interface various peripherals with 8051, Atmega 32, MSP 430 and Arduino. CO3: Simulate the programs on different software platforms.
ANALOG AND DIGITAL COMMUNICATION	CO1: Demonstrate a basic need of modulation and various types of amplitude and angle modulation techniques required for analog communication. CO2: Analyze various AM-FM receivers, along with the effect of noise on analog communication systems. CO3: Explain the designing of digital communication systems by applying knowledge of the various pulse modulation techniques. CO4: Describe various digital modulation techniques and various parameters associated with it. CO5: Identify different types of channel coding techniques and analyze the different spread spectrum methods.
ANALOG AND DIGITAL COMMUNICATION LAB	CO1: Explain the practical aspects of linear and non-linear applications of OP-AMP. CO2: Design the various wave-shaping circuits, oscillators, signal conditioners and various application based circuits using OP-AMP and Transistors CO3: Demonstrate various concepts of analog communication CO4: Explain various concepts of digital communication. CO5: Develop an application-based project using industry based OPAMP
ANALOG SYSTEM DESIGN	CO1: Describe and explain the basic concepts of OPAMP. CO2: Demonstrate and analyze various linear applications of OPAMP CO3: Demonstrate and analyze various non-linear applications of OPAMP CO4: Examine and design DC Power Supply. CO5: Examine and design various types of oscillators and filters.
DATA STRUCTURE & ALGORITHMS	CO1: Student will be able to choose appropriate data structure based on the specified problem definition and analysis the algorithm.

	CO2: Student will be able to handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures. CO3: Students will be able to apply concepts learned in various domains like Operating Systems, DBMS etc. CO 4: Students will be able to use linear and non-linear data structures like stacks, queues, linked list, trees etc.
NUMERICAL MATHEMATICS AND PROBABILITY USING MATLAB	CO1: Learn and use MATLAB effectively in various applications as a simulation tool. CO2: Find an approximate solution of algebraic and transcendental equations, system of linear equations and first order ordinary differential equations by various numerical methods and MATLAB commands. CO3: Apply Z- transform to solve difference equations with constant coefficients. CO4: Analyse real world scenarios to recognize when probability is appropriate, formulate problems about the scenarios; creatively model these in order to solve the problems using multiple approaches CO5: Understand the impact of scientific and engineering solutions in a global and societal context. CO6: Create the groundwork for post-graduate courses, specialized study, and research in mathematics.
PROGRAMMING FOR PROBLEM SOLVING	CO1: Student will be able to understand the basic concepts of Object Oriented Programming and design simple java programs. CO2: Student will be able to apply the knowledge of Inheritance in program development. CO3: Student will able to develop programs using polymorphism and interfaces. CO4: Student will be able to handle various exceptions using concepts of exception handling. CO5: Student will able to use multithreading concepts to develop inter process communication. CO6: Student will be able to understand and implement concepts on file streams and operations in java programming for a given application programs.

PROGRAMMING AND DATA STRUCTURE LAB	CO1: Able to choose appropriate data structure based on the specified problem definition and analysis the algorithm. CO3: Able to handle operations like searching, insertion, deletion and traversing mechanism etc. on various data structures. CO4: Apply the knowledge of Inheritance in program development. CO5: Develop programs using polymorphism and interfaces. CO6: Handle various exceptions using concepts of exception handling.
UNIVERSAL HUMAN VALUES (THEORY)	CO1: Students are expected to become more aware of themselves, and their surroundings (family, society, nature) CO2: Students would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind. CO3: Students would understand values in relationship. CO4: Students would understand the role of a human being in ensuring harmony in society and nature. CO5: Students would distinguish between ethical and unethical practices at work place and would contribute for making a value-based society

5TH SEMESTER:

EMBEDDED SYSTEM DESIGN	CO1.To Describe and analyse the Requirements & Design issues of embedded systems design. CO2. To apply the knowledge of architecture and Programming of for development of simple applications. CO3. To Describe and Demonstrate the interfacing of various peripherals with ARM Processor. CO4. To explain the concept of Real Time Operating System for embedded system design.
EMBEDDED SYSTEM DESIGN :AB	CO1.Apply the knowledge of Instruction skill for the Development of Simple and Complex Programs. CO2. Apply the programming skill for the Development of Simple application. CO3. Apply and Demonstrate the Concept of Interfacing for the Development of Embedded System

ELECTROMAGNETIC WAVES	CO1.Understand the different coordinate system & analyze theorem's of electric Field. CO2. Understand magnetic fields, Apply the Maxwell's equations to solve problems in electromagnetic field theory. CO3. Analyze the propagation of wave in different transmission media. CO4. Understand and analyze various parameters and characteristics of the rectangular waveguide. CO5. Understand principle of radiation and radiation characteristics of an antenna.
DIGITAL SIGNAL PROCESSING	CO1. Analyze discrete time signals and system. CO2.Process the signal in z domain for various discrete time systems. CO3. Draw the structures of various discrete time systems in DFI, DFII, cascade and parallel form. CO4. Apply discrete Fourier transform, its properties &Analyze the discrete time systems in frequency domain. CO5. Understand the filter design techniques for IIR and FIR digital filters and will be able to determine parameters affecting its response.
DIGITAL SIGNAL PROCESSING LAB	CO1. Demonstrate the sampling and reconstruction of discrete time signal & perform different signal operation in developing discrete time system. CO2. Analyze different properties of Z-transform. CO3. Analyze different properties of discrete Time Fourier transform. CO4. Analyze and process the signals in the discrete domain. CO5. Design the filters to suit requirements of specific applications. CO6. Apply the techniques, skills, and modern engineering tools like MATLAB
INDUSTRIAL ECONOMICS AND ENTREPRENEURSHIP DEVELOPMENT.	CO1. Understand different types of business structure. CO2. Acquire the knowledge of different market structures and New economic policy CO3. Grasp the functions of banks, taxations system and implications of Inflation. CO4. Identify various sources of finance

	CO5. Analyse the problems of Small Scall Industries and government's policies for them.
ELECTIVE-I OPERATING SYSTEM	CO1.Explain basic concepts of operating system CO2. Understand the process management policies and scheduling algorithms CO3. Design various memory management techniques CO4. Analyze process synchronization techniques. CO5. Evaluate deadlock detection and prevention mechanism

6TH SEMESTER:

COMPUTER COMMUNICATION NETWORKS	CO1.Describe the basics of Computer Network, Data Communication, Network topologies, transmission media and switching techniques. CO2. Analyze the services and features of various protocols of Data Link Layer and MAC sub-layer. CO3. Apply the concept of IP Addressing techniques and its various protocols of Network Layer. CO4. Describe the transport layer, Application Layer services and its protocol Headers and analyze the congestion control protocols. CO5. Explain the function of Application Layer and Presentation layer paradigm and protocols.
COMPUTER COMMUNICATION NETWORKS LAB	CO1.To analyze and select various cables and Connectors used for networking with computer network security. CO2 To verify the implementation results on software like NS2 and simulate different networking models and implement different networking protocols. CO3 To understand different data transmission techniques using TCP and UDP Protocol for evaluating the different IP addresses for various systems.
INTERNET OF THINGS	CO1.Analyze different design levels of IoT. CO2.Analyse IOT Architecture. CO3.Understand network and communication aspects CO4. Design a portable IoT using Rasperry Pi and Aurdino

	CO5. Analyze applications of IoT in real time scenario
WIRELESS SENSOR NETWORKS	CO1.Demonstrate advanced knowledge and understanding of the engineering principle of sensor design, signal processing, established digital communications techniques, embedded hardware and software, sensor network architecture, sensor networking principles and protocols. CO2. Demonstrate a computing science approach, in terms of software techniques, for wireless sensor networking with emphasis on tiny sensors, sensor specific programming languages, RFID technology, embedded architectures, software program design and associated hardware, data fusion. CO3. Demonstrate knowledge of the associated business, legislative, safety and commercial issues; future technological advances and the way these will impact on the engineering product enterprise process.
ANTENNA AND WAVE PROPAGATION (ELECTIVE-II)	CO1.Describe transmission line characteristics. CO2. Calculate antenna parameters (radiation pattern, beam width, lobes, directivity, gain, impedance, efficiency, polarization) CO3. Analyze wire antennas (monopoles, dipoles, and loops). CO4. Analyze and design antenna arrays. CO5. Describe the operation of broadband and traveling wave antennas. CO6. Describe the operation of aperture and reflector antennas. CO7. Analyze and design Microstrip antennas
CONSUMER ELECTRONICS (OPEN ELECTIVE-I)	CO1.Describe various audio gadgets used in domestic and commercial applications CO2. Describe various video gadgets used in domestic and commercial applications CO3. Explain satellite communication technology along with DTH for day to day application. CO4. Describe various types of home appliances used in domestic life like washing machine, oven RO plant, Mixer, grinder, vaccume cleaner etc. CO5. Understand various types of home appliances used in domestic life like printers, food processors, Induction devices, scanner and fax machines etc.

7th Semester:

DSP PROCESSOR & ARCHITECTURE	CO1: To describe the detailed architecture, addressing mode, instruction sets of TMS320C5X CO2: To write program of DSP processor. CO3: To design & implement DSP algorithm using code composer studio CO4: To design decimation filter and interpolation filter.
DSP PROCESSOR AND ARCHITECTURE LAB	CO1: Understand the architecture of TMS and Motorola Processors. CO2: Implement different processing algorithms on DSP processors. CO3: Design different types of filters and study their characteristics.
TELEVISION AND VIDEO ENGINEERING	CO1: Analyze and understand colour T.V. System CO2: Understand fundamental techniques of Different T.V. standards. CO3: Understand Advanced T.V. Technology. CO4: Understand different video recording, display and its consumer application.
TELEVISION AND VIDEO ENGINEERING LAB	CO1: Study and classify the concept of troubleshoot and repair CO2: Develop an understanding of electronics, mechanical and environmental factors involved in maintaining television equipment. CO3: Analyze and synthesize TV Pictures, Composite Video Signal, TV Receiver Picture Tubes.
OPTICAL COMMUNICATION	CO1: Learn the basic elements of optical fiber. CO2: Understand the different kinds of losses, signal distortion in optical wave guides & other signal degradation factors. CO3: Classify various optical source materials, LED structures, LASER diodes. CO4: Learn the fiber optic receivers such as PIN, APD diodes, receiver operation & performance. CO5: Understand the operational principal of WDM, SONET, measurement of attenuation, dispersion, refractive index profile in optical fibers.

ADVANCED DIGITAL SYSTEM DESIGN	CO1: Design of combinational & sequential circuit. CO2: Develop skilled VLSI front end designers CO3: Implementation of digital system. CO4: Experimentation on Hardware /Software co-design.
ADVANCED DIGITAL SYSTEM DESIGN LAB	CO1: To model, simulate, verify the digital model with hardware description language. CO2: To design and prototype with programmable logic devices CO3: To learn the modular design style to create large digital logic circuits. CO4: To create and simulate basic circuit modules (or macros) using VHDL.
ELECTIVE 1 - DATA COMPRESSION & ENCRYPTION	CO1: Implement various text, audio, video, compression technique. CO2: Provide various authentication using digital communication. CO3: Gain the knowledge of encryption techniques application to digital communication.

8th Semester:

MICROWAVE & RADAR ENGINEERING	CO1. Understand the use of active and passive microwave devices and different Klystrons CO2. Analyze Different UHF components with the help of Scattering Matrix parameter. CO3. Understand micro strip lines MIC design CO4. Analyze the different power distribution Tees. CO5. Do research with capabilities in the design, development and manufacture of radar systems used in a wide spectrum of applications, specialization in areas of Radar engineering and able to identify, formulate and model problems and find Radar engineering solutions based on a system approach.
MICROWAVE AND RADAR ENGINEERING LAB	CO1: Describe working of microwave bench. CO2: Measure power & VSWR of microwave component. CO3: Analyze the S-parameter of microwave component.

COMPUTER COMMUNICATION NETWORK	CO1: Understand the requirement of theoretical & practical aspect of computer network. CO2: Understand the network traffic in computer network. CO3: Describe various protocols used in network. CO4: Describe the concept of computer network security. CO5: Understand the different wired &wireless LAN stds & Routers.
COMPUTER COMMUNICATION NETWORK LAB	CO1: understand and select various cables and connectors used for networking CO2: Establish peer to peer computers as well as Local Area Network connectivity CO3: Effectively use available networking tools in Computer Communication Network
WIRELESS & MOBILE COMMUNICATION	CO1: Design a model of cellular system communication and analyze their operation and performance. CO2: Quantify the causes and effects of path loss and signal fading on received signal characteristics. CO3: to construct and analyze the GSM system.
Elective 2- EMBEDDED SYSTEMS	CO1: Design embedded based system. CO2: Design embedded system based on RTOS and communication protocols.
Elective 3- SATELLITE COMMUNICATION	CO1: Do research with capabilities in the design, development and manufacture of satellite communication systems used in a wide spectrum of applications. CO2: Experience real world experience from household appliances to sophisticated satellite communication, from electronic ignition to neural networks and signal processing chips & to integrate academic discipline with project-based engineering applications, classroom learning theory CO3: Able for Acquisition of technical competence in specialized areas of Satellite Communication engineering. CO4: Able to identify, formulate and model problems and find Satellite Communication engineering solutions based on a system approach.

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