


 MANJARA CHARITABLE TRUST
 RAJIV GANDHI INSTITUTE OF TECHNOLOGY, MUMBAI
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Department of Electronics and Telecommunication Engineering

Course Objectives and Course Outcomes

Semester-III			
Course Code	Course Name	Course Objectives	Course Outcomes
ECC302	Electronic Devices & Circuits-I	Students will try to learn: <ol style="list-style-type: none"> To understand operation of semiconductor devices. To understand DC analysis and AC models of semiconductor devices. To apply concepts for the design of Regulators and Amplifiers To verify the theoretical concepts through laboratory and simulation experiments. To implement mini projects based on concept of electronics circuit concepts. 	After successful completion of the course student will be able to <ol style="list-style-type: none"> Understand the current voltage characteristics of semiconductor devices, Analyze dc circuits and relate ac models of semiconductor devices with their physical Operation, Design and analyze of electronic circuits, Evaluate frequency response to understand behavior of Electronics circuits.
ECC303	Digital System Design	Students will try to learn: <ol style="list-style-type: none"> To understand number representation and conversion between different representation in digital electronic circuits. To analyze logic processes and implement logical operations using combinational logic circuits. To understand characteristics of memory and their classification. To understand concepts of sequential circuits and to analyze sequential systems in terms of state machines. To understand concept of Programmable Devices, PLA, PAL, CPLD and FPGA and implement digital system using VHDL. To implement combinational and sequential circuits using VHDL. 	After successful completion of the course student will be able to <ol style="list-style-type: none"> Develop a digital logic and apply it to solve real life problems. Analyze, design and implement combinational logic circuits. Classify different semiconductor memories. Analyze, design and implement sequential logic circuits. Analyze digital system design using PLD. Simulate and implement combinational and sequential circuits using VHDL systems.
ECC304	Circuit Theory and Networks	Students will try to learn: <ol style="list-style-type: none"> To analyze the Circuits in time and frequency domain 	After successful completion of the course student will be able to


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		2. To study network Topology, network Functions, two port network 3. To synthesize passive network by various methods	1. Apply their knowledge in analysing Circuits by using network theorems. 2. Apply the time and frequency method of analysis. 3. Find the various parameters of two port network. 4. Apply network topology for analyzing the circuit 5. Synthesize the network using passive elements.
ECC305	Electronic Instrumentation & Control	Students will try to learn: 1. To provide basic knowledge about the various sensors and data acquisition systems applied in Wireless sensor network. 2. To provide fundamental concepts of control system such as mathematical modeling, time response and frequency response. 3. To develop concepts of stability and its assessment criteria.	After successful completion of the course student will be able to 1. Students will be able to explain principle of operation for various sensors. 2. Students will be able to describe functional blocks of data acquisition system. 3. Students will be able to find transfer functions for given system. 4. Students will be able to calculate time domain and frequency domain parameter for given system 5. Students will be able to predict stability of given system using appropriate criteria.
Semester-IV			
ECC402	Electronic Devices & Circuits-II	Students will try to learn: 1. To understand the operation of the various bias circuits of MOSFET and Analyze and design MOSFET bias circuits. 2. To understand the operation and design of multistage amplifier for a given specification. 3. To understand the operation and design of transformer coupled various types of power amplifier circuits. 4. To understand the effects of negative feedback on amplifier circuits. 5. To analyze the different RC and LC oscillator circuits to determine the frequency of oscillation	After successful completion of the course student will be able to 1. Design and analyze the basic operations of MOSFET. 2. Know about the multistage amplifier using BJT and FET in various configuration to determine frequency response and concept of voltage gain. 3. Know about different power amplifier circuits, their design and use in electronics and communication circuits. 4. Know the concept of feedback amplifier and their characteristics


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			5. Design the different oscillator circuits for various frequencies
ECC403	Linear Integrated Circuits	Students will try to learn: 1. To understand the concepts, working principles and key applications of linear integrated circuits. 2. To perform analysis of circuits based on linear integrated circuits. 3. To design circuits and systems for particular applications using linear integrated circuits.	After successful completion of the course student will be able to 1. Understand the fundamentals and areas of applications for the integrated circuits. 2. Analyze important types of integrated circuits. 3. Demonstrate the ability to design practical circuits that perform the desired operations. 4. Understand the differences between theoretical, practical & simulated results in integrated circuits. 5. Select the appropriate integrated circuit modules to build a given application.
ECC404	Signals and Systems	Students will try to learn: 1. To introduce students the concept and theory of signals and systems needed in electronics and telecommunication engineering fields. 2. To introduce students to the basic idea of signal and system analysis and its characterization in time and frequency domain	After successful completion of the course student will be able to 1. Understand about various types of signals and systems, classify them, analyze them, and perform various operations on them, 2. Understand use of transforms in analysis of signals and system in continuous and discrete time domain. 3. Observe the effect of various properties and operations of signals and systems. 4. Evaluate the time and frequency response of Continuous and Discrete time systems which are useful to understand the behaviour of electronic circuits and communication system
ECC405	Principles of Communication Engineering	Students will try to learn: 1. To introduce students to various modulation and demodulation techniques of analog communication. 2. To analyze different parameters of analog communication techniques. 3. It also focuses on pulse modulation and demodulation	After successful completion of the course student will be able to 1. Use of different modulation and demodulation techniques used in analog communication 2. Identify and solve basic communication problems


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			3. Analyze transmitter and receiver circuits 4. Compare and contrast design issues, advantages, disadvantages and limitations of analog communication systems
Semester-V			
ETC501	Microcontroller & Applications	Students will try to learn: 1. To develop background knowledge and core expertise of microcontroller. 2. To know the importance of different peripheral devices and their interfacing to microcontrollers. 3. To know the design aspects of microcontrollers. 4. To write assembly language programs of microcontrollers for various applications.	At the end of course, a student will be able to: 1. Draw and describe architecture of 8051 and ARM7 microcontroller. 2. Interface various peripheral devices to the microcontrollers. 3. Write assembly language program for microcontrollers. 4. Design microcontroller based system for various applications.
ETC502	Analog Communication	Students will try to learn: 1. The fundamentals of basic communication system. 2. Various modulation and demodulation techniques used in analog communication, noise handling and multiplexing 3. The working principles of transmitters and receivers used in analog communication systems.	After successful completion of the course students will able to 1. The different modulation and demodulation techniques used in analog communication. 2. Identify and solve basic communication problems, analyze transmitter and receivers. Detect the errors that occur due to noise during transmission. 3. Compare and contrast advantages and limitations of analog communication systems.
ETC503	Random Signal Analysis	Students will try to learn: 1. Random Variables and Random Process 2. The design of the systems which involves randomness using mathematical analysis and computer simulations.	At the end of the course, students will able to: 1. Apply theory of probability in identifying and solving relevant problems. 2. Define and differentiate random variables and vector through the use of cumulative distribution function (CDF), probability density function (PDF), probability mass function (PMF) as well as joint, marginal and conditional CDF, PDF and PMF. 3. Show probability and expectation computations using important discrete and


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			<p>continuous random variable types. Define and specify random processes and determine whether a given process is stationary or wide sense stationary. 4. Determine the response of a linear time invariant system to such a random process. 5. Describe basic concepts related to Markov chains and queuing theory and relate it to real world applications.</p>
ETC504	RF Modeling and Antennas	<p>Students will try to learn:</p> <ol style="list-style-type: none"> 1. Design of different types of passive filters used for radio frequency application. 2. Radiation phenomena and pattern of various antennas. 3. The various characteristics of different types of antennas 	<p>On Completion of this course Student will be able to:</p> <ol style="list-style-type: none"> 1. Analyze and design RF Filters 2. Analyze the radiation mechanisms of antennas 3. Demonstrate knowledge of antennas in communication systems. Ability to discriminate between antennas on the basis of their electrical performance. 4. Discriminate various antennas on the basis of their electrical performance.
ETC505	Integrated Circuits	<p>Students will try to learn:</p> <ol style="list-style-type: none"> 1. Fundamentals of analog and digital integrated circuits. 2. Design methodologies using practical integrated circuits. 3. The application areas of integrated circuits 	<p>After successful completion of the course student will be able to:</p> <ol style="list-style-type: none"> 1. Understand the fundamentals and areas of applications for the Integrated Circuits. 2. Analyze important types of integrated circuits of day-to-day requirements. 3. Demonstrate the ability to design practical circuits that perform the desired operations. 4. Understand the differences among theoretical, practical & simulated results in integrated circuits. 5. Choose the appropriate integrated circuit modules to build a given application
Semester-VI			
ETC601	Digital Communication	<p>Students will try to learn:</p> <p>Aim is to identify the functions of different components</p>	<p>At the end of course, student will be able to :</p> <ol style="list-style-type: none"> 1. Understand the basics of information theory


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		<ol style="list-style-type: none"> 1. Learn about theoretical bounds on the rates of digital communication system and represent a digital signal using several modulation methods 2 .Draw signal space diagrams, compute spectra of modulated signals and apply redundancy for reliable communication. 	<ol style="list-style-type: none"> and coding techniques. 2. Determine the minimum number of bits per symbol required to represent the source and the maximum rate at which a reliable Communication can take place over the channel. 3. Describe and determine the performance of different waveform techniques for the generation of digital representation of signals. 4. Determine methods to mitigate inter symbol interference in baseband transmission system. 5. Describe and determine the performance of different error control coding schemes for the reliable transmission of digital representation of signals and information over the channel. 6. Understand various spreading techniques and determine bit error performance of various digital communication systems.
ETC602	Discrete Time Signal Processing	<p>Students will try to learn:</p> <ol style="list-style-type: none"> 1. To develop a thorough understanding of the central elements of discrete time signal processing theory and the ability to apply this theory to real-world signal processing applications. 2 .Use z-transforms and discrete time Fourier transforms to analyze a digital system. 3. Understand the discrete Fourier transform (DFT), its applications and its implementation by FFT techniques. 4. Design and understand finite & infinite impulse response filters for various applications. 5. The course is a prerequisite course for further studying of other multimedia related courses, such as speech processing, image processing, audio and video data compression, pattern recognition, communication systems and so forth. 	<p>At the end of course, Student will able to :</p> <ol style="list-style-type: none"> 1. Formulate engineering problems in terms of DSP tasks 2. Apply engineering problem solving strategies to DSP problems 3. Design and test signal processing algorithms for various applications 4. Recover information from signals • Design and simulate digital filters
ETC603	Computer Communication	<p>Students will try to learn:</p> <ol style="list-style-type: none"> 1. To introduce analysis and design of computer and 	<p>Upon completion of the subject, students will be able to:</p>


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	Networks	<p>communication networks.</p> <p>2. To understand the network layered architecture and the protocol stack.</p>	<ol style="list-style-type: none"> 1. Assemble the components of a PC and install one or more network operating systems resulting in a functioning 2. Design a small or medium sized computer network including media types, end devices, and interconnecting devices that meets a customer's specific needs. 3. Perform basic configurations on routers and Ethernet switches. 4. Demonstrate knowledge of programming for network communications 5. Learn to simulate computer networks and analyze the simulation results 6. Troubleshoot connectivity problems in a host occurring at multiple layers of the OSI model 7. Develop knowledge and skills necessary to gain employment as computer network engineer and network administrator.
ETC604	Television Engineering	<p>Students will try to learn:</p> <ol style="list-style-type: none"> 1. To introduce the basics of picture transmission and reception. 2. To become well conversant with new development in video engineering. 3. To introduce most latest and revolutionary ideas in the field of digital TV, HDTV, WDTV 	<p>Upon completion of the subject, students will be able to:</p> <ol style="list-style-type: none"> 1. Describe and differentiate working principles of latest digital TV, HDTV, WDTV. 2. Understand, use and working principles of latest display like LCD, LED, Plasma and large plat panel monitors
ETC605	Operating System	<p>Students will try to learn:</p> <ol style="list-style-type: none"> 1. To introduce operating system as a resource manager, its evolutions and fundamentals. 2. To help student understand concept of process and different process (linear and concurrent) Scheduling policies. 3. To help student familiar with memory, file and I/O management policies. 	<p>On completing this course students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the role of an operating system, its function and issues. 2. Compare between different algorithms used for management and scheduling of processes, Memory and input-output operation. 3. Appreciate the role of various productivity enhancing tools.
ETC606	VLSI Design	<p>Students will try to learn:</p>	<p>After successful completion of the course</p>


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		<ol style="list-style-type: none"> To teach fundamentals of VLSI circuit design and implementation using circuit simulators and layout editors. To highlight the circuit design issues in the context of VLSI technology. 	<p>student will be able to:</p> <ol style="list-style-type: none"> Demonstrate a clear understanding of CMOS fabrication flow and technology scaling. Design MOSFET based logic circuit Draw layout of a given logic circuit Realize logic circuits with different design styles Demonstrate an understanding of working principle of operation of different types of memories Demonstrate an understanding of working principles of clocking, power reduction and distribution
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Semester-VII

ETC701	Image and Video Processing	<p>Students will try to learn:</p> <ol style="list-style-type: none"> To cover the fundamentals and mathematical models in digital image and video processing To develop time and frequency domain techniques for image enhancement. To expose the students to current technologies and issues in image and video processing. To develop image and video processing applications in practice. 	<p>After successful completion of the course student will be able to:</p> <ol style="list-style-type: none"> Understand theory and models in Image and Video Processing. Interpret and analyze 2D signals in frequency domain through image transforms. Apply quantitative models of image and video processing for various engineering applications. Develop innovative design for practical applications in various fields.
ETC702	Mobile communication	<p>Students will try to learn:</p> <ol style="list-style-type: none"> To study the concept of Mobile radio propagation, cellular system design. To understand mobile technologies like GSM and CDMA. To know the mobile communication evolution of 2G, 3G and 3 GPP in detail. To have overview of immerging technologies for 4 G standards. 	<p>After successful completion of the course student will be able to:</p> <ol style="list-style-type: none"> Understand GSM, CDMA concepts and architecture, frame structure, system capacity, services provided. Study of evolution of mobile communication generations 2G, 2.5G, 3G with their characteristics and limitations. Understand emerging technologies required for fourth generation mobile systems such as SDR, MIMO etc.


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			4. Understand different indoor and outdoor propagation models related to losses and different types of fading
ETC703	Optical Communication and Networks	Students will try to learn: 1. Optical fiber structures wave guide, fabrication and signal degradation in fiber. 2. The characteristics of optical sources and detectors. 3. Link budget and optical networks, design and management. 4. Study the multiplexing schemes.	This course enables the students to: 1. Apply the fundamental principles of optics and light wave to design optical fiber communication systems. 2. Identify structures, functions, materials, and working principle of optical fibers, light sources, couplers, detectors, and multiplexers. 3. Design optical fiber communication links using appropriate optical fibers, light sources, couplers, detectors, and multiplexers. 4. Explore concepts of designing and operating principles of modern optical communication systems and networks. 5. Apply the knowledge developed in-class to contemporary optical fiber communication research and industrial areas.
ETC704	Microwave and Radar Engineering	Students will try to learn: 1. Radio-frequency spectrum space, microwave communication. 2. Microwave principles, working of microwave devices. 3. RADAR and their applications.	After Completing this course students will be able to: 1. Analyze the microwave passive circuit components and design the tuning and matching networks. 2. Identify the state of art in microwave tubes and semiconductors and their uses in real life. 3. Apply the microwave devices and RADAR for industrial and scientific purposes
ETE701	Data Compression and Encryption	Students will try to learn: 1. Lossless and Lossy compression techniques for different types of data. 2. Understand data encryption techniques 3. Network security and ethical hacking.	After Completing this course students will be able to: 1. Implement text, audio and video compression techniques. 2. Understand symmetric and asymmetric key cryptography schemes. 3. Understand network security and ethical


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			hacking.
ETE702	Statistical Signal Processing	Students will try to learn: <ol style="list-style-type: none"> To enable the student to understand the basic principles of random signal processing. To study spectral detection and estimation methods used in communication system design and their applications. 	After Completing this course students will be able to: <ol style="list-style-type: none"> Design System for estimation, spectral estimation To perform wave formation analysis of the system Understand role of statistical fundamentals in real world applications.
ETE703	Neural Networks and Fuzzy Logic	Students will try to learn: <ol style="list-style-type: none"> Concepts and understanding of artificial neural networks Fuzzy logic basic theory and algorithm formulation To solve real world problems. 	After Completing this course students will be able to: <ol style="list-style-type: none"> Knowledge about different neural networks, their architecture and training algorithm Concept of Fuzzy logic, Fuzzy Sets, fuzzy rules and fuzzy reasoning Exposure to the applicability of neural networks and fuzzy logic
ETE704	CMOS Analog and Mixed Signal VLSI Design	Students will try to learn: <ol style="list-style-type: none"> Importance of CMOS and Mixed Signal VLSI design in the field of Electronics and Telecommunication. Underlying methodologies for analysis and design of fundamental CMOS Analog and Mixed signal Circuits like Current and Voltage references, Single stage Amplifiers, Operational Amplifiers, Data Converters. The issues associated with high performance Mixed Signal VLSI Circuits. 	After successful completion of the course student will be able to: <ol style="list-style-type: none"> Differentiate between Analog, Digital and Mixed Signal CMOS Integrated Circuits. Analyze and design current sources and voltage references for given specifications. Analyze and design single stage MOS Amplifiers. Analyze and design Operational Amplifiers. Analyze and design data converter circuits.
Semester-VIII			
ETC801	Wireless Networks	Students will try to learn: <ol style="list-style-type: none"> Introduction to planning and design of wireless networks Introduction to HSPA systems To study emerging technologies like Bluetooth, zigbee, Wimax Understanding the wireless sensor network architecture 	After Completing this course students will be able to: <ol style="list-style-type: none"> Describe the phases of planning and design of mobile wireless networks List and compare personal area network (PAN) technologies such as Zigbee, Bluetooth etc


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		and the protocol stack and WSN applications.	3. Students will details of sensor network architecture, traffic related protocols , transmission technology etc. 4. Understand middleware protocol and network management issues of sensor networks
ETC802	Satellite Communication and Network	Students will try to learn: 1. To provide an in-depth understanding of different concepts used in a satellite communication system. 2. To explain the tools necessary for the calculation of basic parameters in a satellite communication system. 3. To get knowledge of every aspects of satellite communication like orbital mechanics, launching techniques, satellite link design, earth station technology and different access system towards a satellite.	After Completing this course students will be able to: 1. Explain the basics of satellite communication 2. Explain and analyzes link budget of satellite signal for proper communication 3. Use the system for the benefit of society 4. Use the different application of satellite communication
ETC803	Internet and Voice Communication	Students will try to learn: 1. To focus on Internet protocol, standards, services and administration. 2. To discuss voice over IP as a real-time interactive audio/video service.	After Completing this course students will be able to: 1. Implement local area networks using both static and dynamic addressing techniques including sub netting. 2. Install, configure, and troubleshoot server and client operating systems. 3. Disassemble, troubleshoot/debug, upgrade, replace basic components, and reassemble servers and client systems. 4. Explain the concept of encapsulation and its relationship to layering in the network models. 5. Explain how TCP's byte-stream sliding window is related to a traditional packet-based sliding window algorithm. 6. Explain the operation of the components of a router including, DHCP, NAT/PAT, Routing function, Switching function. 7. Describe how DNS works in the global Internet including caching and root servers.
ETE801	Speech	Students will try to learn:	After Completing this course students will be


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	Processing	<ol style="list-style-type: none"> 1. To introduce the models of speech production and acoustic phonetics 2. To teach time and frequency domain techniques for estimating speech parameters 3. To teach predictive techniques for speech coding 4. To introduce speech recognition and speech synthesis applications 	able to: <ol style="list-style-type: none"> 1. Demonstrate basic knowledge in speech production mechanism, phoneme classification, digital models for speech production, Homomorphic speech processing and LPC analysis 2. Demonstrate applications of signal processing theory for estimation of speech parameters in time and frequency domain including pitch and formants 3. Analyze application of speech processing in speech compression, speech recognition, and speech synthesis 4. Enhance their written and oral technical communication skills related to speech processing subject and will be better prepared for higher study and lifelong learning
ETE802	Telecom Network Management	Students will try to learn: <ol style="list-style-type: none"> 1. To familiarize the student with the design, analysis operation and management of modern data communications networks. 2. To provide the student with a working knowledge of the types of communications network management systems and their strengths and limitations in solving various information network management problems. 	After Completing this course students will be able to: <ol style="list-style-type: none"> 1. Demonstrate broad knowledge of fundamental principles and technical standards underlying 2. Understand basic of telecommunication, networking and information technologies. 3. Architect and implement networked informative systems. 4. Continuously improve their technology knowledge and communication skills. 5. Anticipate the way technological change and emerging technologies might alter the assumptions underlying architectures and systems.
ETE803	Microwave Integrated Circuit	Students will try to learn: <ol style="list-style-type: none"> 1. To understand the integration of microwave devices in the form of IC. 2. To understand the basic principles and advanced applications of Microwave Engineering, 	After Completing this course students will be able to: <ol style="list-style-type: none"> 1. Design and implement the microwave layouts. 2. Design and implement the microwave amplifier, oscillator, and mixer circuits


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		3.To design different amplifier, oscillator and mixers for various applications	
ETE804	Ultra Wide Band Communication	Students will try to learn: 1. To focuses on the basic techniques that concerns present and future dynamic UWB communication systems. 2. To encompass all areas of design and implementation of UWB systems. 3. To develop a comprehensive overview of UWB system design that spans propagation, transmit and receive antenna implementations, standards and advanced topics, modulation and multiple access, network issues, and applications.	After Completing this course students will be able to: 1. Understand nuances of planning and design of RF network 2. Work professionally in the area of Antenna design and Radio Propagation. 3. Apply the knowledge of mathematics and engineering to solve practical EM engineering problems.