

SNDT Women's University

Usha Mittal Institute of Technology

Name of Program: Bachelor of Technology (057)

Name of Course: Electronics and Communication

Program Outcomes

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes

At the end of the program, the student:

PSO1. Should be able to understand the concepts and demonstrate knowledge in the field of Communication Engineering /networking, Signal processing, Embedded system and semiconductor technology.

PSO2. Should be able to design projects using modern design tools to associate the learning from the courses to arrive at solutions to real world problems.

PSO3. Will be able to use research based knowledge and research methods for investigation and analysis of Complex problem.

PSO4. Should possess the skills to communicate in both oral and written forms, the work already done and the future plans with necessary road maps, demonstrating the practice of professional ethics and the concerns for societal and environmental wellbeing.

Course Outcomes

Semester-I

Course Code	Course Name	Course Outcomes
Basic Science course (BSC101)	Applied Science (Physics and Chemistry)	<ol style="list-style-type: none"> Learn about electric and magnetic fields. Learn about scalar and vector fields. Maxwell's equations that define basic laws of electromagnetism. Propagation of electromagnetic waves through free space (Vacuum or Non conducting media). Analyse atomic and molecular structure in terms of wavefunctions, charge densities and energy level diagrams. Obtain quantitative information about energy levels through molecular spectroscopic methods such as electronic, vibrational, rotational and nuclear magnetic resonance (NMR) spectroscopy. Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity
Basic Science course (BSC103)	Mathematics-I	<p>The students will learn:</p> <ol style="list-style-type: none"> To apply differential calculus to notions of curvature and to improper integrals. Apart from some other applications they will have a basic understanding of Beta and Gamma functions. The fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems. The tool of power series and Fourier series for learning advanced Engineering Mathematics. To deal with functions of several variables that are essential in most branches of Engineering. The essential tool of matrices and linear algebra in a comprehensive manner.
Engineering Science Courses (ESC101)	Basic Electrical Engineering	<ol style="list-style-type: none"> To understand and analyse basic electric and magnetic circuits To study the working principles of electrical machines To introduce the components of low voltage electrical installations
Engineering Science Courses (ESC102)	Engineering Graphics & Design	<ol style="list-style-type: none"> To prepare you to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability To prepare you to communicate effectively

		3. To prepare you to use the techniques, skills, and modern engineering tools necessary for engineering practice
	Applied Science Lab	The physics and chemistry laboratory course will consist of experiments illustrating the principles of physics and chemistry relevant to the study of science and engineering. The students will learn to: <ol style="list-style-type: none"> 1. Analyse & generate experimental skills 2. Learn and apply basic techniques used in chemistry laboratory for preparation, purification and identification. 3. Employ the basic techniques used in chemistry laboratory for analyses such as chromatography, spectroscopy, volumetric titrations, conductometry. 4. Learn safety rules in the practice of laboratory investigations.
	Basic Electrical Engineering Lab	Get an exposure to common electrical components and their ratings. <ol style="list-style-type: none"> 1. Make electrical connections by wires of appropriate ratings. 2. Understand the usage of common electrical measuring instruments. 3. Understand the basic characteristics of transformers and electrical machines. 4. Get an exposure to the working of power electronic converters.
	Engineering Graphics Design	Students prepare for actual work situations through practical training in a new state-of-the-art computer designed CAD laboratory using engineering software
	Induction Program	After completing this course the student will be able to <ol style="list-style-type: none"> 1. Develop a better understanding and a sense of responsibility towards self, family, country and nature. 2. Acquire knowledge and meta skills about engineering as a profession 3. Develop a keen sense of understanding about basic human values and ethics 4. Appreciate the importance of physical and emotional well-being and practices to lead a fulfilling life 5. Bond with peers, teachers, college and syllabus and develop interests in creative and personality development activities

Semester-II

Course Code	Course Name	Course Outcomes
Basic Science course (BSC102)	Applied Science (Physics and Chemistry)	<ol style="list-style-type: none"> 1. Imparted knowledge about simple harmonic oscillations, mechanical and electric oscillators. 2. Learn about different kinds of damping in harmonic oscillators. Learn about non dispersive transverse and longitudinal waves in one dimension, acoustic waves and sound waves. 3. Know about interference and diffraction phenomena. They will also learn about Michelson Interferometer (also learn why the result was negative. Learn about why they found no significant difference between the speed of light in the direction of movement through the presumed aether, and the speed at right angles. 4. Understand how Young's double slit experiment and diffraction grating work. 5. Interaction of radiation with matter, Einstein coefficients , working of different types of Lasers and their application in science, engineering and medicine.

		<ol style="list-style-type: none"> Rationalise bulk properties and processes using thermodynamic considerations. Understand the energies existing in a bulk macroscopic system. List major chemical reactions that are used in the synthesis of molecules. Rationalize the terms and concepts involved in Stereochemistry like symmetry operations, chirality, isomerism etc.
Basic Science course (BSC104)	Mathematics-II	<ol style="list-style-type: none"> The mathematical tools needed in evaluating multiple integrals and their usage. The effective mathematical tools for the solutions of differential equations that model physical processes. The tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems.
Engineering Science Courses (ESC103)	Programming for Problem Solving	<ol style="list-style-type: none"> To formulate simple algorithms for arithmetic and logical problems. To translate the algorithms to programs (in C language). To test and execute the programs and correct syntax and logical errors. To implement conditional branching, iteration and recursion. To decompose a problem into functions and synthesize a complete program using divide and conquer approach. To use arrays, pointers and structures to formulate algorithms and programs. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems. To apply programming to solve simple numerical method problems, namely root finding of function, differentiation of function and simple integration.
Engineering Science Courses (ESC104)	Workshop/Manufacturing Practices	Upon completion of this course, the students will gain knowledge of the different manufacturing processes which are commonly employed in the industry, to fabricate components using different materials.
Humanities and Social Sciences including Management courses HSM (101)	English	<p>After completing this course, students will</p> <ol style="list-style-type: none"> Acquire basic proficiency in English grammar and vocabulary Develop good writing skills Demonstrate skills required for presentations Acquire skills to participate in interview
	Applied Science Lab	<p>The students will learn to:</p> <ol style="list-style-type: none"> Estimate rate constants of reactions from concentration of reactants/products as a function of time Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc Synthesize a small drug molecule and analyse a salt sample
	Programming for Problem Solving Lab	<ol style="list-style-type: none"> To formulate the algorithms for simple problems To translate given algorithms to a working and correct program To be able to correct syntax errors as reported by the compilers

		<ol style="list-style-type: none"> 4. To be able to identify and correct logical errors encountered at run time 5. To be able to write iterative as well as recursive programs 6. To be able to represent data in arrays, strings and structures and manipulate them through a program 7. To be able to declare pointers of different types and use them in defining self referential structures. 8. To be able to create, read and write to and from simple text files.
	Workshop /Manufacturing Practices Lab English Practical	<ol style="list-style-type: none"> 1. Upon completion of this laboratory course, students will be able to fabricate components with their own hands. 2. They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes. 3. By assembling different components, they will be able to produce small devices of their interest.
	English Practical	The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.
	Environmental Sciences	<p>After completing this course, students will be able to</p> <ol style="list-style-type: none"> 1. Apply the basic knowledge of environmental protection, sustainable development and improvement. 2. Categorize and scrutinize impact of human development on natural resources. Provide the student with an understanding of radioactive waste. 3. Interpret the impact of environmental problems on socio economic growth and human health. 4. Apply various strategies, technological improvement, and methods for sustainable management of environmental systems and for the remediation of degraded environment. 5. Apply different Science and Technology (S&T) based sustainability solutions and limitations as well as to identify impact of human population on the natural environment and human health.

Semester-III

Course Code	Course Name	Course Outcomes
EC 341211	Electronics Devices	<ol style="list-style-type: none"> 1. Understand the principles of semiconductor Physics 2. Design & analyse transistorized circuits with biasing techniques 3. Understand different types of diodes and its day to day application
EC 341221	Electronics Devices Lab	<ol style="list-style-type: none"> 1. Analyse the practical behaviour or characteristics of semiconductor diode 2. Examine the different clippers and clampers circuit rectifier and filters by simulation 3. Experimentally analysing the different configurations of transistors 4. Experimentally determine Voltage Gain, Current Gain, Input Impedance, Output Impedance of a BJT amplifier in CE mode
EC 341212	Digital System Design	<ol style="list-style-type: none"> 1. Design and analyse combinational logic circuits 2. Design & analyse modular combinational circuits with MUX/DEMUX, Decoder, Encoder 3. Design & analyse synchronous sequential logic circuits 4. Use HDL & appropriate EDA tools for digital logic design and simulation

EC 341222	Digital System Design Lab	<ol style="list-style-type: none"> 1. Implement and analyse combinational logic circuits with gates 2. Implement & analyse modular combinational circuits with MUX/DEMUX, Decoder, Encoder 3. Implement & analyse synchronous sequential logic circuits 4. Effective use of HDL & appropriate EDA tools for digital logic design and simulation
EC 341213	Signal and System	<ol style="list-style-type: none"> 1. At the end of this course students will demonstrate the ability to Analyse different signals 2. Represent continuous and discrete systems in time and frequency domain using different transforms 3. Investigating whether the system is stable 5. Sampling and reconstruction of a signal
EC 341214	Computer Architecture	<p>At the end of this course students will demonstrate the ability to</p> <ol style="list-style-type: none"> 1. learn how computers work 2. know basic principles of computer's working 3. Analyse the performance of computers 4. know how computers are designed and built 5. Understand issues affecting modern processors (caches, pipelines etc.).
BSC 311211	Applied Mathematics	<p>At the end of this course students will demonstrate the ability to</p> <ol style="list-style-type: none"> 1. Learn how computers work 2. Know basic principles of computer's working 3. Analyse the performance of computers 4. Know how computers are designed and built 5. Understand issues affecting modern processors (caches, pipelines etc.).
MC 381251	Constitution of India	<p>After completing this course, students will be able to</p> <ol style="list-style-type: none"> 1. Understand the constitutional framework and state and central policies 2. Display awareness of fundamental right and duties of a citizen 3. Demonstrate awareness about engineering ethics and responsibilities of an engineer 4. Display awareness about human rights in India
PS 391221	Data Structure and Algorithms Lab	<p>At the end of this course students will demonstrate the ability to</p> <ol style="list-style-type: none"> 1. For a given logic sentence express it in terms of predicates, quantifiers, and logical connectives 2. For a given a problem, derive the solution using deductive logic and prove the solution based on logical inference 3. Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra
HSMC 331211	Economics for Engineer	<ol style="list-style-type: none"> 1) Students will understand and demonstrate core micro-economic terms, concepts, and theories. 2) Students will understand elasticity, market structure, cost, tax, budget in Indian economy. 3) Students will be able to describe how economic trade-offs and social values impact public/private policy 4) Students will be able to analyze the applications of linear programming concept in economics.
Semester-IV		
Course Code	Course Name	Course Outcomes

EC 441211	Electromagnetic Waves*	<ol style="list-style-type: none"> 1. Characterize Uniform Plane Wave 2. Analyze the reflection and transmission of waves at media interface 3. Explain the wave propagation in metallic waveguides 4. Understand the principle of radiation and radiation characteristics of an Antenna
EC 441221	Electromagnetic Waves Labs*	<ol style="list-style-type: none"> 1. Acquire more insight into field concepts through problem solving. 2. Understand wave propagation and associated phenomena through visual/simulation tools available. 3.
EC 441212	Analog Circuits*	<p>At the end of this course students will demonstrate the ability to</p> <ol style="list-style-type: none"> 1. Analyse various configurations amplifier circuits. 2. Design sinusoidal and non-sinusoidal oscillators. 3. Understand the functioning of OP-AMP and design OP-AMP based circuits. 4. Design ADC and DAC.
EC 441222	Analog Circuits Lab*	<ol style="list-style-type: none"> 1. Implement and analyse various configurations amplifier circuits 2. Implement and analyse various sinusoidal and non-sinusoidal oscillators 3. Implement and analyse various OP-AMP based applications circuits.
EC 441213	Microcontrollers*	<p>At the end of this course students will demonstrate the ability to</p> <ol style="list-style-type: none"> 1. Do assembly language programming 2. Do interfacing design of peripherals like, I/O, A/D, D/A, timer etc. 3. Develop systems using different microcontrollers 4. Understand RSIC processors and design ARM microcontroller based Systems
EC 441223	Microcontrollers Lab*	<ol style="list-style-type: none"> 1. Implement and analyse the algorithms to perform various arithmetic operations using 8085 and/ or 8051 2. Implement and analyse the algorithms to perform various logical operations using 8085 and/ or 8051 3. Implement and analyse the algorithms to perform various operations using branching instructions of 8085 and/ or 8051 4. Implement and analyse the algorithms to perform various data transfer operations using 8085 and/ or 8051 5. Implement and analyse the algorithms to perform various data sorting operations using 8085 and/ or 8051
EC 441214	Probability Theory and Stochastic Processes *	<p>At the end of this course students will demonstrate the ability to</p> <ol style="list-style-type: none"> 1. Understand representation of random signals 2. Investigate characteristics of random processes 3. Make use of theorems related to random signals 4. Understand propagation of random signals in LTI systems.
EC 441215	Network Theory*	<p>At the end of this course students will demonstrate the ability to</p> <ol style="list-style-type: none"> 1. Understand basic electrical circuits with nodal and mesh analysis. 2. Appreciate electrical network theorems. 3. Apply Laplace Transform for steady state and transient analysis. 4. Determine different network functions. 5. Appreciate the frequency domain techniques. 6.

HSMC 431211	HSMC-03 (Intellectuals Property Right)	<ol style="list-style-type: none"> To develop an understanding of IPR. To understand patents and filing them To develop an understanding of Trademark, Copyright and geographical indications and filing them Analyze the case studies based on IPR laws in India and Abroad.
PS 491221	Object Oriented Programing *	<p>At the end of this course students will demonstrate the ability to</p> <ol style="list-style-type: none"> Specify simple abstract data types and design implementations, using abstraction functions to document them. Recognise features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity. Name and apply some common object-oriented design patterns and give examples of their use. Design applications with an event-driven graphical user interface.
Semester- V		
Course Code	Course Name	Course Outcomes
5151	Microprocessor- I	<ol style="list-style-type: none"> Understand architecture of 8085,register organization in 8085. Learn the instruction set of 8085 and it's classification, Program Development for 8085,Understand various addressing modes of 8085. Understand the exact execution by drawing timing diagrams. To study various interfacing devices like latch, decoder, tristate buffer and the interfacing methods. Learn the interrupt structure, Stack memory concept Design of minimum system design for 8085. Learn organization and operation of various peripheral devices like 8255,8253,8259,8357,ADC and DAC. .Interfacing of all peripherals with 8085.
5152	Filter Theory	<ol style="list-style-type: none"> Understand the concept of different types of filter. Concept of network functions and their reliability. Design of an analog filters using different Approximation methods Synthesis of active filter and passive filter. Design of different types of digital filters and its realization. Design and analysis of active filters
5153	Antenna Theory	<ol style="list-style-type: none"> Identify basic antenna parameters. Design and analyze antenna arrays. Design and analyze wire and aperture antennas. Identify the characteristics of radio-wave propagation
5154	Control System	<ol style="list-style-type: none"> Students can able to understand and categorize different types of system and identify a set of algebraic equations to represent and model a complicated system into a more simplified form Students can able to Characterize any system in Laplace domain to illustrate different specification of the system using transfer function concept

		<ol style="list-style-type: none"> 3. Students can able to interpret different physical and mechanical systems in terms of electrical system to construct equivalent electrical models for analysis 4. Students can able to employ time domain analysis to predict and diagnose transient performance parameters of the system for standard input functions 5. Students can formulate different types of analysis in frequency domain to explain the nature of stability of the system.
5101	Communication Skills-II	<p>After Completing this course, students will be able to</p> <ol style="list-style-type: none"> 1. Design Technical documents with precision of language, vocabulary and style 2. Recognize attributes of a suitable candidate for a job by participating in resume writing, group discussions and interviews 3. Deliver formal presentations 4. Demonstrate Knowledge of Professional Ethics and Behavior
5155	Principles of Communication	<ol style="list-style-type: none"> 1. Describe the basic principle of communication system 2. Demonstrate and solve communication system parameters for various types of modulation and demodulation techniques. 3. Apply the concepts to practical applications in telecommunication
5251	Microprocessor-I Lab	<ol style="list-style-type: none"> 1. Implement and analyse the algorithms to perform various arithmetic operations using 8085 2. Implement and analyse the algorithms to perform various logical operations using 8085 3. Implement and analyse the algorithms to perform various operations using branching instructions of 8085 4. Implement and analyse the algorithms to perform various data transfer operations using 8085 5. Implement and analyse the algorithms to perform various data sorting operations using 8085
5252	Principles of Communication Lab	<ol style="list-style-type: none"> 1. understand concept of all types of modulation techniques using tool 2. understand concept of all types of de- modulation techniques using simulation tools 3. study of various coding techniques 4. Practical application of all modulation, demodulation techniques
5253	Filter Theory Lab	<ol style="list-style-type: none"> 1. Design of different analog filters and digital filters 2. Analysis of different types of filters 3. Applications of filters 4. Frequency response of different filters
5254	Control System Lab	<ol style="list-style-type: none"> 1. Demonstrate the concept of synchronous transmitter and receiver by using Hardware 2. Solve different block diagrams of control systems using software tool 3. Show different time-domain responses for different standard inputs in computer as well as using hardware 4. Analyze and examine the stabilities of different closed (automatic) control systems using different stability-analysis tool e.g. Nyquist or Bode plots.
Semester-VI		

Course Code	Course Name	Course Outcomes
6151	Microprocessor-II	<ol style="list-style-type: none"> 1. Learn architecture of 8086,register organization inside it, comparison with 8085. 2. Instruction set of 8086 and program development for 8086. 3. Understand architecture of 80386,register organization, modes of operation, address calculation mechanism. 4. Learn architecture of 8051,register organization, instructions of 8051, 5. program development for 8051. 6. To study advanced microcontrollers like ARM processors with their architecture, register organization
6152	Digital Communication	<ol style="list-style-type: none"> 1. Understand the basics of information theory, source coding techniques and calculate Entropy of source 2. 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 3. Understand the generation, detection signal space diagram, spectrum, bandwidth efficiency, and probability of error analysis of different band pass modulation techniques. 4. Describe and determine the performance of line codes and methods to mitigate inter symbol interference. 5. Learn the generation and detection of base band system
6112	Digital Signal Processing	<ol style="list-style-type: none"> 1. Study the time domain and the frequency domain representation of signals. 2. Understand the different methods for transformation of signals 3. Understand the properties of discrete Fourier transform. 4. Use mathematical model of signals for analysis. 5. Represent a DT-LTI system by different structures. 6. Analyse and predict the behaviors of linear system. 7. Get the Knowledge of Digital signal processor 8. Introduction to different applications of DSP.
6113	Microwave Engineering	<p>At the end of the course, students will demonstrate the ability to:</p> <ol style="list-style-type: none"> 1. Understand various microwave system components their properties. 2. Appreciate that during analysis/ synthesis of microwave systems, the different mathematical treatment is required compared to general circuit analysis. 3. Design microwave systems for different practical application. 4. Design a microwave system given the application specifications
6114	Radar Engineering	<p>On successful completion of the course, students will be able to:</p> <ol style="list-style-type: none"> 1. Understand of concept of Basic Radar 2. Learn the radar Tracking methods 3. Radar signal detection in presence of noise and clutters
6251	Microprocessor-II Lab	<ol style="list-style-type: none"> 1. Implement and analyze the algorithms to perform various arithmetic operations using 8086 and /or 8051

		<ol style="list-style-type: none"> 2. Implement and analyze the algorithms to perform various logical operations using 8086 3. Implement and analyze the algorithms to perform various operations using branching instructions of 8086 4. Implement and analyze the algorithms to perform various data transfer operations using 8086 5. Implement and analyze the algorithms to perform various data sorting operations using 8086
6253	Digital Communication Lab	<ol style="list-style-type: none"> 1. Able to design and implement different modulation and demodulation techniques. 2. Able to understand basic theories of Digital communication system in practical 3. Able to analyze digital modulation techniques by using MATLAB tools. 4. Able to identify and describe different techniques in Modern digital communications, in particular in source coding using MAT Lab or open source tools.
6252	Digital Signal Processing Lab	<ol style="list-style-type: none"> 1. Applications of DFT properties for analysis of DT-LTI systems 2. Applications of DSP processors 3. Different mathematical tools for transformation of signals from time domain to frequency domain or vice-versa.
6212	Microwave and Antenna Lab	<ol style="list-style-type: none"> 1. Able to handle microwave equipment. 2. Able to understand microwave measurements. 3. Able to understand Wave guide and antenna measurements
6213	Radar Engineering Lab	<ol style="list-style-type: none"> 1. Compare working of different types of radars. 2. Analyze the statistical parameters of Noise and Radar cross section of targets 3. Distinguish the fixed and moving targets using different types of radar systems 4. Explain various techniques employed in Guided missiles and Navigation.
6319	Seminar	<ol style="list-style-type: none"> 1. Study research papers for understanding of recent advancements in technologies of their interest, to summarise and review them, with the help of research papers published in journals (like IEEE, Elsevier). 2. Identify the latest trends in the technologies of their interest 3. Impart skills in preparing detailed report describing the selected topic for presentation 4. Effectively communicate with the help of an oral and graphical presentation before examiners

Semester-VII

Course Code	Course Name	Course Outcomes
7511	Computer and Communication Network	<ol style="list-style-type: none"> 1. To develop an understanding of computer networking basics. 2. Describe how computer networks are organized with the concept of layered approach. 3. To develop an understanding of different components of computer networks, various protocols, modern technologies and their applications

		<ol style="list-style-type: none"> 4. Analyze the contents in a given data link layer packet, based on the layer concept. 5. Design logical subnetting, IP addressing and understand concepts of routing protocol and TCP/IP
7512	Fiber Optics Communication	<ol style="list-style-type: none"> 1. Recognize and classify the structures of Optical fiber and types. 2. Discuss the channel impairments like losses and dispersion. 3. Analyze various coupling losses. 4. Classify the Optical sources and detectors and to discuss their principle. 5. Familiar with Design considerations of fiber optic systems. 6. To perform characteristics of optical fiber, sources and detectors, design as well as conduct experiments in software and hardware, analyze the results to provide valid conclusions
7551	Embedded and IOT System	<p>The co for embedded system are after studying the subject the students will be</p> <ol style="list-style-type: none"> 1. Able to define what an embedded system is in terms of its interface. 2. Will be able to identify key design features of designing an embedded system 3. Easily differentiate between a normal OS and RTOS with mathematical behavior for task scheduling. 4. Enumerate the components of an embedded system. Name the core hardware components most commonly used in IoT devices. 5. describe the interaction between software and hardware in an IoT device.
7751	Coding Techniques and Cryptography	<p>On the completion of this course, students will be able to</p> <ol style="list-style-type: none"> 1. Understand error-control coding 2. Understand encoding and decoding of digital data stream. 3. Be familiar with the methods of generation of these codes and their decoding techniques. 4. Understand the concept of cryptography and how it is used to secure information. 5. Student can implement their own cryptographic algorithm.
7513	Mobile Communication	<p>On the completion of this course, students will be able to</p> <ol style="list-style-type: none"> 1. Understand concept of mobile radio communication and Cellular system. 2. Understand Mobile technologies like GSM and CDMA 3. To know evolution of 2G,3G and 3G in detail.
7611	Communication Network Lab	<p>The objective of this lab course is to get practical knowledge of working principles of various communication protocols. analyze structure and formats of TCP/IP layer protocols using network tools such as Wireshark and network simulators. Implementing various network algorithms such as error control, error detection, routing, and security related algorithms.</p> <ol style="list-style-type: none"> 1. Understand the practical approach to network communication protocols. 2. Understand network layers, structure/format and role of each network layer. 3. Able to design and implement various network application such as data transmission between client and server, file transfer, real-time multimedia transmission. 4. Understand the various Routing Protocols/Algorithms and Internetworking

7612	Fiber Optics Lab	<ol style="list-style-type: none"> 1. Understand various signal degradation mechanisms 2. Understand the reliability issues in optical communication system 3. Design implements and test WDM system using basic components
7851	Coding Techniques and Cryptography Lab	<ol style="list-style-type: none"> 1. Learn the open-source software which is used to implement Cryptographic Algorithm. 2. Implementation of Symmetric key Algorithm 3. Implementation of Asymmetric Key Algorithm 4. Implement Finite field algorithm
7613	Mobile Communication Lab	<ol style="list-style-type: none"> 1. Implementation of the concept of frequency reuse for designing of cellular system 2. Implementation of Multiple Access Schemes to increase the capacity of cellular systems. 3. Implementation of advanced modulation techniques to increase the capacity of Mobile systems 4. Implementation of techniques to combat fading in Wireless environment. 5. To determine bit error probability of advanced modulation techniques used for fourth generation wireless Systems.
7651	Embedded and IOT Lab	<ol style="list-style-type: none"> 1. To create an environment for design, develop and testing of small IoT solutions, using python and simulation software. 2. The students will also be able to identify key components of IoT hardware and software. 3. The students will be able to use Linux OS concepts to implement basic task related operations.
7911	Project-1	<ol style="list-style-type: none"> 1. Understand programming language concepts, particularly Java and object-oriented concepts or go through research activities. 2. Plan, analyse, design and implement a software project or gather knowledge over the field of research and design or plan about the proposed work. 3. Demonstrate the ability to locate and use technical information from multiple sources. 4. Demonstrate the ability to communicate effectively in speech and writing. 5. Learn to work as a team and to focus on getting a working project done on time with each student being held accountable for their part of the project

Semester-VIII

Course Code	Course Name	Course Outcomes
8511	Wireless Network	<ol style="list-style-type: none"> 1. Understand fundamentals of wireless communications. 2. Understand the various terminology, principles, devices, schemes, concepts, algorithms and different methodologies used in Wireless Communication Networks. 3. Analyze energy efficiency, mobility, scalability, security and their unique characteristics in wireless networks. 4. Demonstrate basic skills for cellular networks design. 5. To know latest wireless technologies and trends in the wireless communication 6. Understand the transmission of voice and data through various networks

8611	Wireless Network Lab	<ol style="list-style-type: none"> 1. Implementation of Ad-Hoc Network Routing Protocols. 2. Implementation of Wireless Sensor Network MAC/Routing Protocols. 3. Implementation of CDMA2000 modulation process 4. Generation of PN sequences used in CDMA2000 and understand their characteristics 5. Implementation of IEEE802.11 protocol.
8911	Project-II	<ol style="list-style-type: none"> 1. Understand programming language concepts, simulation tools or go through the research work and gather knowledge over the field and develop an ability to apply them to software design of real life problems in an industry/ commercial environment 2. Plan, analyse, design a software project and demonstrate the ability to communicate effectively in speech and writing. 3. Understand how to write and publish technical paper.
8912	Project-III	<ol style="list-style-type: none"> 1. Learn about and go through the software/hardware development cycle with emphasis on different processes -requirements, design, and implementation phases 2. Gain confidence at having conceptualized, designed, and implemented a working, medium sized project with their team. 3. Understand how to present and give demo of project on various platforms.
	Elective -II	
8712	VLSI Technology	<ol style="list-style-type: none"> 1. Identify the various IC fabrication methods. 2. Express the Layout of simple MOS circuit 3. Apply the Lambda based design rules for subsystem design 4. Learn various low power VLSI design techniques 5. Understand various HDL languages
	VLSI Technology Lab	<ol style="list-style-type: none"> 1. Learn the fundamental principles of VLSI circuit design in digital and analog domain. 2. Learn various aspects of a VLSI design circuit software in real time 3. Understand DC analysis, Transient analysis, power analysis for various VLSI circuit styles with their thorough meaning in real time.