Course Outcomes

COs

2021 Scheme

Course Name	Mathematics Course
Course Code	21MAT31
CO1	To solve ordinary differential equations using Laplace transform.
CO2	Demonstrate the Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory.
CO3	To use Fourier transforms to analyse problems involving continuous-time signals and to apply Z-Transform techniques to solve difference equations
CO4	To solve mathematical models represented by initial or boundary value problems involving partial differential equations.
CO5	Determine the extremals of functionals using calculus of variations and solve problem arising in dynamics of rigid bodies and vibrational analysis.

Course Name	Digital System Design using Verilog
Course Code	21EC32
CO1	Simplify Boolean functions using K-map and Quine-McCluskey minimization technique.
CO2	Analyse and design for combinational logic circuits.
CO3	Analyse the concepts of Flip Flops (SR, D, T and JK) and to design the synchronous sequential circuits using Flip Flops.
CO4	Model Combinational circuits (adders, subtractors, multiplexers) and sequential circuits using Verilog

Course Name	Basic Signal Processing
Course Code	21EC33
CO1	Understand the basics of Linear Algebra
CO2	Analyse different types of signals and systems
CO3	Analyse the properties of discrete-time signals & systems
CO4	Analyse discrete time signals & systems using Z transforms

Course Name	Analog Electronic Circuits
Course Code	21EC34
CO1	Understand the characteristics of BJTs and FETs for switching and amplifier circuits.
CO2	Design and analyse FET amplifiers and oscillators with different circuit configurations and biasing conditions.
CO3	Understand the feedback topologies and approximations in the design of amplifiers and oscillators.
CO4	Design of circuits using linear ICs for wide range applications such as ADC, DAC, filters and timers.
CO5	Understand the power electronic device components and its functions for basic power electronic circuits.

Course Name	Analog and Digital Electronics Lab
Course Code	21ECL35
CO1	Design and analyse the BJT/FET amplifier and oscillator circuits.
CO2	Design and test Opamp circuits to realize the mathematical computations, DAC and precision rectifiers.
CO3	Design and test the combinational logic circuits for the given specifications.
CO4	Test the sequential logic circuits for the given functionality.
CO5	Demonstrate the basic electronic circuit experiments using SCR and 555 timers.

Course Name	Social Connect and Responsibility
Course Code	21SCR36
CO1	Understand social responsibility
CO2	Practice sustainability and creativity

CO3	Showcase planning and organizational skills

Course Name	Samskrutika Kannada
Course Code	21KSK37
CO1	
CO2	
CO3	
CO4	

Course Name	Balake Kannada
Course Code	21KBK37
CO1	
CO2	
CO3	
CO4	

Course Name	Constitution of India and Professional Ethics
Course Code	21CIP37
CO1	Analyse the basic structure of Indian Constitution.
CO2	Remember their Fundamental Rights, DPSP's and Fundamental Duties (FD's) of our constitution.
CO3	Know about our Union Government, political structure & codes, procedures.
CO4	Understand our State Executive & Elections system of India.
CO5	Remember the Amendments and Emergency Provisions, other important provisions given by the constitution.

Course Name	National Service Scheme
Course Code	21NS83
Course Outcomes (Cos): At the end of the course the student will be able to:	
CO1	Understand the importance of his / her responsibilities towards society.
CO2	Analyze the environmental and societal problems/issues and will be able to design solutions for the same.
CO3	Evaluate the existing system and to propose practical solutions for the same for sustainable development.
CO4	Implement government or self-driven projects effectively in the field.

Course Name	Physical Education (Sports and Athletics)
Course Code	21PE83
CO1	The importance of fitness/sports in day-to-day life
CO2	Benefits of Yoga on fitness and health
CO3	Understand the importance of his/her responsibility towards the society.
CO4	Analyze the environmental and societal problems/issues and will be able to design solutions for the same

Course Name	Yoga
Course Code	21YO83
CO1	The importance of fitness/sports in day-to-day life
CO2	Benefits of Yoga on fitness and health
CO3	Understand the importance of his/her responsibility towards the society.
CO4	Analyze the environmental and societal problems/issues and will be able to design solutions for the same

Course Name	Additional Mathematics-I
Course Code	21MATDIP31
CO1	Test for consistency and solve the system of linear equations
CO2	Solve higher order differential equations
CO3	Apply elementary probability theory and solve related problems
CO4	To interpolate/extrapolate from the given data

Course Name	LD (Logic Design) Lab using Pspice / MultiSIM
Course Code	21EC381
CO1	Demonstrate the truth table of various expressions and combinational circuits using logic gates.
CO2	Design various combinational circuits such as adders, subtractors, comparators, multiplexers and code converters.
CO3	Construct flips-flops, counters and shift registers.
CO4	Design and implement synchronous counters.

Course Name	AEC (Analog Electronic Circuits) Lab
Course Code	21EC382
CO1	Understand the circuit schematic and its working.
CO2	Study the characteristics of different electronic devices.
CO3	Design and test simple electronic circuits as per the specifications using discrete electronic components.
CO4	Compute the parameters from the characteristics of active devices.
CO5	Familiarize with EDA software which can be used for electronic circuit simulation.

Course Name	LIC (Linear Integrated Circuits) Lab using Pspice / MultiSIM
Course Code	21EC383
CO1	Sketch/draw circuit schematics, construct circuits, analyze and troubleshoot circuits containing op-amps, resistors, diodes, capacitors and independent sources.
CO2	Relate to the manufacturer's data sheets of IC 555 timer and IC μa741 op-amp.
CO3	Realize and verify the operation of analog integrated circuits like Amplifiers, Precision Rectifiers, Comparators and Waveform generators.
CO4	Design and implement analog integrated circuits like Oscillators, Active filters, Timer circuits, Data converters and compare the experimental results with theoretical values.

Course Name	LabVIEW Programming Basics
Course Code	21EC384
CO1	Use Lab VIEW to create data acquisition, analysis and display operations
CO2	Create user interfaces with charts, graph and buttons
CO3	Use the programming structures and data types that exist in Lab VIEW
CO4	Use various editing and debugging techniques

Course Name	Maths for Communication Engineers
Course Code	21MAT41
CO1	Use the concepts of the analytical function and complex potentials to solve the problems arising in electromagnetic field theory. Utilise conformal transformation and complex integral arising in aerofoil theory, fluid flow visualisation and image processing.
CO2	Obtain series solutions of ordinary differential equation.
CO3	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data
CO4	Apply discrete and continuous probability distributions in analysing the probability models arising in engineering field.
CO5	Construct Joint Probability distribution and demonstrate the validity of testing and hypothesis.

Course Name	Digital Signal Processing
Course Code	21EC42
CO1	Determine response of LTI systems using time domain and DFT techniques
CO2	Compute DFT of real and complex discrete time signals
CO3	Compute DFT using FFT algorithms
CO4	Design FIR and IIR Digital Filters
CO5	Design of Digital Filters using DSP processor

Course Name	Circuits & Controls
Course Code	21EC43
CO1	Analyse and solve Electric circuit, by applying, loop analysis, Nodal analysis and by applying network Theorems.
CO2	Evaluate two port parameters of a network and Apply Laplace transforms to solve electric networks.
CO3	Deduce transfer function of a given physical system, from differential equation representation or Block Diagram representation and SFG representation.
CO4	Calculate time response specifications and analyse the stability of the system.
CO5	Draw and analyse the effect of gain on system behaviour using root loci.
CO6	Perform frequency response Analysis and find the stability of the system.
CO7	Represent State model of the system and find the time response of the system

Course Name	Communication Theory
Course Code	21EC44
CO1	Understand the amplitude and frequency modulation techniques and perform time and frequency domain transformations.
CO2	Identify the schemes for amplitude and frequency modulation and demodulation of analog signals and compare the performance.
CO3	Characterize the influence of channel noise on analog modulated signals.
CO4	Understand the characteristics of pulse amplitude modulation, pulse position modulation and pulse code modulation systems.
CO5	Illustration of digital formatting representations used for Multiplexers, Vocoders and Video transmission.

Course Name	Biology for Engineers
Course Code	21BE45
CO1	Elucidate the basic biological concepts via relevant industrial applications and case studies.
CO2	Evaluate the principles of design and development, for exploring novel bioengineering projects.
CO3	Corroborate the concepts of biomimetics for specific requirements.
CO4	Think critically towards exploring innovative biobased solutions for socially relevant problems

Course Name	Communication Laboratory I
Course Code	21ECL46
CO1	Demonstrate the AM and FM modulation and demodulation by representing the signals in time and frequency domain.
CO2	Design and test the sampling, Multiplexing and PAM with relevant circuits.
CO3	Demonstrate the basic circuitry and operations used in AM and FM receivers.
CO4	Illustration of digital formatting representations used for Multiplexers, Vocoders and Video transmission.

Course Name	Embedded C Basics
Course Code	21EC481
CO1	Write C programs in 8051 for solving simple problems that manipulate input data using different instructions of 8051 C.
CO2	Develop testing and experimental procedures on 8051 Microcontroller, analyze their operation under different cases.
CO3	Develop programs for 8051 Microcontroller to implement real world problems.
CO4	Design and Develop Mini projects

Course Name	C++ Basics
Course Code	21EC482
CO1	Write C++ program to solve simple and complex problems
CO2	Apply and implement major object-oriented concepts like message passing, function overloading, operator overloading and inheritance to solve real-world problems.
CO3	Use major C++ features such as Templates for data type independent designs and File I/O to deal with large data set.
CO4	Analyze, design and develop solutions to real-world problems applying OOP concepts of C++

Course Name	Octave / Scilab for Signals
Course Code	21EC483
CO1	Demonstrate the DSP concepts on signal generation and sampling using Scilab/Octave
CO2	Design and verify the computation of discrete signals using Scilab/Octave.
CO3	Demonstrate and verify the application of FFT/DFT algorithm for a given signal using Scilab/Octave.
CO4	Design and demonstrate programs to evaluate different types of low and high pass FIR filters
CO5	Design, demonstrate and visualize different real world signals using Scilab/Octave programs.

Course Name	DAQ using LabVIEW
Course Code	21EC484
CO1	Build temperature indicating instruments using LabVIEW (NI DAQ)
CO2	Interface peripheral devices/instruments to LabVIEW
CO3	Build LabVIEW modules to sense and process audio inputs
CO4	Apply programming structures, data types, and the analysis and signal processing algorithms in LabVIEW
CO5	Debug and troubleshoot applications

Course Name	Universal Human Values
Course Code	21UH49
CO1	By the end of the course, students are expected to become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind. They would have better critical ability. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society). It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction. Therefore, the course and further follow up is expected to positively impact common graduate attributes like: 1. Holistic vision of life 2. Socially responsible behaviour 3. Environmentally responsible work

	4. Ethical human conduct
	5. Having Competence and Capabilities for Maintaining Health and Hygiene
	6. Appreciation and aspiration for excellence (merit) and gratitude for all.

Course Name	Inter/ Intra Institutional Internship
Course Code	21INT49
CO1	
CO2	
CO3	
CO4	
CO5	

Course Name	Additional Mathematics II
Course Code	21MATDIP41
CO1	Test for consistency and solve the system of linear equations
CO2	Solve higher order differential equations
CO3	Apply elementary probability theory and solve related problems
CO4	To interpolate/extrapolate from the given data
CO5	Apply the knowledge of numerical methods in modelling and solving engineering problems

Course Name	Digital Communication
Course Code	21EC51
CO1	Analyze different digital modulation techniques and choose the appropriate modulation technique for the given specifications.
CO2	Test and validate symbol processing and performance parameters at the receiver under ideal and corrupted bandlimited channels.
CO3	Differentiate various spread spectrum schemes and compute the performance parameters of communication system.
CO4	Apply the fundamentals of information theory and perform source coding for given message.
CO5	Apply different encoding and decoding techniques with error Detection and Correction.

Course Name	Computer Organization & ARM Microcontroller
Course Code	21EC52
CO1	Explain the basic organization of a computer system.
CO2	Demonstrate functioning of different sub systems, such as processor, Input/output, and memory.
CO3	Describe the architectural features and instructions of 32-bit microcontroller ARM Cortex M3.
CO4	Apply the knowledge gained for Programming ARM Cortex M3 for different applications.

Course Name	Computer Communication Networks
Course Code	21EC53
CO1	Understand the concepts of networking thoroughly.
CO2	Identify the protocols and services of different layers.
CO3	Distinguish the basic network configurations and standards associated with each network.
CO4	Discuss and analyse the various applications that can be implemented on networks.

Course Name	Electromagnetic Waves
Course Code	21EC54
CO1	Evaluate problems on electrostatic force, electric field due to point, linear, volume charges by applying conventional methods and charge in a volume.
CO2	Apply Gauss law to evaluate Electric fields due to different charge distributions and Volume Charge distribution by using Divergence Theorem.
CO3	Determine potential and energy with respect to point charge and capacitance using Laplace

| CO4 | Calculate magnetic force, potential energy and Magnetization with respect to magnetic materials and voltage induced in electric circuits. |
| CO5 | Apply Maxwell's equations for time varying fields, EM waves in free space and conductors and Evaluate power associated with EM waves using Poynting theorem. |

Course Name	Communication Lab II
Course Code	21ECL55
Course Outcomes (Cos): At the end of the course the student will be able to:	
CO1	Design and test the digital modulation circuits and display the waveforms.
CO2	To Implement the source coding algorithm using C/C++/ MATLAB code.
CO3	To Implement the Error Control coding algorithms using C/C++/ MATLAB code.
CO4	Illustrate the operations of networking concepts and protocols using C programming and network

Course Name	Research Methodology and Intellectual Property Rights
Course Code	21EC56
CO1	To know the meaning of engineering research.
CO2	To know the procedure of Literature Review and Technical Reading.
CO3	To know the fundamentals of patent laws and drafting procedure.
CO4	Understanding the copyright laws and subject matters of copyrights and designs
CO5	Understanding the basic principles of design rights

Course Name	Environmental Studies
Course Code	21CIV57
CO1	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale
CO2	Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.
CO3	Demonstrate ecology knowledge of a complex relationship between biotic and a biotic component.
CO4	Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues.

Course Name	IOT (Internet of Things Lab)
Course Code	21EC581
CO1	Understand internet of Things and its hardware and software components
CO2	Interface I/O devices, sensors & communication modules
CO3	Remotely monitor data and control devices
CO4	Develop real life IoT based projects

Course Name	Communication Simulink Toolbox
Course Code	21EC582
CO1	Perform sampling, aliasing, filtering, and quadrature modulation through simulation.
CO2	Plot signal space representation of digital modulation techniques.
CO3	Design and implement a pulse shape and matched filter to avoid inter-symbol interference and maximize receiver SNR.
CO4	Demonstrate advanced wireless communication techniques like Multipath fading, CCI etc. and model

Course Name	Java Programming
Course Code	21EC583
CO1	Use Eclipse/NetBeans IDE to design, develop, debug Java Projects.

CO2	Analyze the necessity for Object Oriented Programming paradigm over structured programming and become familiar with the fundamental concepts in OOP.
CO3	Demonstrate the ability to design and develop java programs, analyze, and interpret object-oriented data and document results.
CO4	Apply the concepts of multiprogramming, exception/event handling, abstraction to develop robust Programs

Course Name	Data Structures using C++
Course Code	21EC584
CO1	Identify the appropriate data structures and algorithms for solving real world problems.
CO2	Implement various kinds of searching and sorting techniques.
CO3	Implement data structures such as stacks, queues and Search trees to solve various

Course Name	Technological Innovation Management and Entrepreneurship
Course Code	21EC61
CO1	
CO2	
CO3	
CO4	

Course Name	Microwave Theory and Antennas
Course Code	21EC62
CO1	Describe the use and advantages of microwave transmission
CO2	Analyze various parameters related to transmission lines.
CO3	Identify microwave devices for several applications.
CO4	Analyze various antenna parameters and their significance in building the RF system.
CO5	Identify various antenna configurations for suitable applications.

Course Name	VLSI Design and Testing
Course Code	21EC63
CO1	Demonstrate understanding of MOS transistor theory, CMOS fabrication flow and technology scaling.
CO2	Draw the basic gates using the stick and layout diagram with the knowledge of physical design aspects.
CO3	Interpret memory elements along with timing considerations.
CO4	Interpret testing and testability issues in combinational logic design.

Course Name	Artificial Neural Networks
Course Code	21EC641
CO1	Demonstrate the AM and FM modulation and demodulation by representing the signals in time and frequency domain.
CO2	Design and test the sampling, Multiplexing and PAM with relevant circuits.
CO3	Demonstrate the basic circuitry and operations used in AM and FM receivers.
CO4	Illustration of digital formatting representations used for Multiplexers, Vocoders and Video transmission.

Course Name	Cryptography
Course Code	21EC642
CO1	Explain traditional cryptographic algorithms of encryption and decryption process.
CO2	Use symmetric and asymmetric cryptography algorithms to encrypt and decrypt the data.
CO3	Apply concepts of modern algebra in cryptography algorithms.
CO4	Design pseudo random sequence generation algorithms for stream cipher systems.

Course Name	Python Programming
Course Code	21EC643
CO1	To acquire programming skills in Python
CO2	To demonstrate data structure representation using Python
CO3	To develop the skill of pattern matching and files in Python
CO4	To acquire Object Oriented Skills in Python
CO5	To develop the ability to write database applications in Python

Course Name	Micro Electro Mechanical Systems
Course Code	21EC644
CO1	Appreciate the technologies related to Micro Electro Mechanical Systems.
CO2	Understand design and fabrication processes involved with MEMS devices.
CO3	Analyse the MEMS devices and develop suitable mathematical models
CO4	Know various application areas for MEMS device.

Course Name	VLSI Laboratory
Course Code	21ECL66
CO1	Design and simulate combinational and sequential digital circuits using Verilog HDL.
CO2	Understand the synthesis process of digital circuits using EDA tool.
CO3	Perform ASIC design flow and understand the process of synthesis, synthesis constraints and evaluating the synthesis reports to obtain optimum gate level netlist.
CO4	Design and simulate basic CMOS circuits like inverter, common source amplifier, differential
CO5	Perform RTL_GDSII flow and understand the stages in ASIC design.

Course Name	Mini Project
Course Code	21ECMP67
CO1	Present the mini-project and be able to defend it.
CO2	Make links across different areas of knowledge and to generate, develop and evaluate ideas and information so as to apply these skills to the project task.
CO3	Habituated to critical thinking and use problem solving skills.
CO4	Communicate effectively and to present ideas clearly and coherently in both the written and oral forms.
CO5	Learn on their own, reflect on their learning and take appropriate actions to improve it.

Course Name	Communication Engineering
Course Code	21EC651
CO1	Describe the scheme and concepts of radiation and propagation of communication signals through air.
CO2	Understand the AM and FM modulation techniques and represent the signal in time and frequency domain relations.
CO3	Understand the process of sampling and quantization of signals and describe different methods to generate digital signals.
CO4	Describe the basic digital modulation techniques, channel capacity, source coding technique and the channel coding.
CO5	Compare the different wireless communication systems and describe the structure of cellular communication.

Course Name	Microcontrollers
Course Code	21EC652
CO1	Explain the difference between Microprocessors & Microcontrollers, Architecture of 8051 Microcontroller, Interfacing of 8051 to external memory and Instruction set of 8051.
CO2	Develop 8051 Assembly level programs using 8051 instructions set.

CO3	Develop 8051 Assembly / C language program to generate timings and waveforms using 8051 timers, to send & receive serial data using 8051 serial ports.
CO4	Develop 8051 Assembly / C language programs to generate square wave on 8051 I/O port pin using interrupt and C Programme to send & receive serial data using 8051 serial ports.
CO5	Interface various peripheral devices to 8051 using I/O ports.

Course Name	Basic VLSI Design
Course Code	21EC653
CO1	Demonstrate understanding of MOS transistor theory, CMOS fabrication flow and technology scaling.
CO2	Draw the basic gates using the stick and layout diagrams with the knowledge of physical design aspects.
CO3	Interpret Memory elements along with timing considerations
CO4	Demonstrate knowledge of FPGA based system design
CO5	Interpret testing and testability issues in VLSI Design
CO6	Analyze CMOS subsystems and architectural issues with the design constraints.

Course Name	Electronic Circuits with Verilog
Course Code	21EC654
CO1	Under the Verilog HDL design flow.
CO2	Describe the basic concepts of Verilog HDL programming.
CO3	Design of digital electronics circuits using dataflow, behavioural, gate-level, and structural modelling.
CO4	Design complex digital circuits using advanced Verilog concepts.

Course Name	Sensors and Actuators
Course Code	21EC655
CO1	Discuss the fundamental concepts related to sensors and measurement, functional elements of measurement system, I/O Characteristics of measurement system.
CO2	Interpret and analyse the static and dynamic characteristics of instruments.
CO3	Elucidate the working principle and usage of different transducers for temperature, displacement and level measurement.
CO4	Discuss the principle and working of different types of actuators used in industrial application.
CO5	Discuss the principle and working of strain, force and torque measurement.

Course Name	Innovation/ Entrepreneurship/Societal Internship
Course Code	21INT68
CO1	Classification and characterization of optical fibers with different modes of signal propagation.
CO2	Describe the constructional features and the characteristics of optical fiber and optical devices used for signal transmission and reception.
CO3	Understand the essential concepts and principles of mobile radio channel and cellular communication.
CO4	Describe various multiple access techniques used in wireless communication systems.
CO5	Describe the GSM architecture and procedures to establish call set up, call progress handling and call tear down in a GSM cellular network.

Course Name	Advanced VLSI
Course Code	21EC71
CO1	Understand VLSI design flow
CO2	Describe the concepts of ASIC design methodology
CO3	Create floor plan including partition and routing with the use of CAD algorithms
CO4	Will have better insights into VLSI back-end design flow
CO5	Learn verification basics and System Verilog

Course Name	Advanced Design Tools for VLSI
Course Code	21EC721
CO1	Classification and characterization of optical fibers with different modes of signal propagation.
CO2	Describe the constructional features and the characteristics of optical fiber and optical devices used for signal transmission and reception.
CO3	Understand the essential concepts and principles of mobile radio channel and cellular communication.
CO4	Describe various multiple access techniques used in wireless communication systems.
CO5	Describe the GSM architecture and procedures to establish call set up, call progress handling and

Course Name	DSP algorithms and Architecture
Course Code	21EC723
Course Outcomes (Cos): At the end of the course the student will be able to:	
CO1	Comprehend the knowledge & concepts of digital signal processing techniques.
CO2	Apply knowledge of various types of addressing modes, interrupts, peripherals and pipelining structure of TMS320C54xx processor.
CO3	Develop assembly language programs to implement FIR, IIR filters and FFT algorithms.
CO4	Build the Applications on Programmable DSP devices.

Course Name	Biomedical Signal Processing
Course Code	21EC724
CO1	Describe the origin, properties and suitable models of important biological signals such as ECG and EEG
CO2	Know the basic signal processing techniques in analysing biological signals.
CO3	Acquire mathematical and computational skills relevant to the field of biomedical signal processing
CO4	Describe the basics of ECG signal compression algorithms.
CO5	Know the complexity of various biological phenomena.

Course Name	IOT and Wireless Sensor Network
Course Code	21EC731
CO1	Understand the characteristics, building blocks, enabling technologies of the IoT systems
CO2	Describe the characteristics and applications of domain specific IoTs.
CO3	Discuss the overview of the Wireless sensor networks characteristics and applications.
CO4	Present the sensor, transmission technology and systems associated with WSN.
CO5	Understand the concepts of middleware, performance evaluation and traffic management in WSN.

Course Name	Network Security
Course Code	21EC732
CO1	Explain network security services and mechanisms and explain security concepts
CO2	Understand the concept of Transport Level Security and Secure Socket Layer.
CO3	Explain Security concerns in Internet Protocol security
CO4	Explain Intruders, Intrusion detection and Malicious Software
CO5	Describe Firewalls, Firewall Characteristics, Biasing and Configuration

Course Name	Fabrication Technology
Course Code	21EC733
CO1	Understanding the process in the field of Fabrication technology.
CO2	Understand the properties and growth mechanism of oxidation.

CO3	Relate to the competing methods of various lithographic techniques and their limitations.
CO4	Analyse the diffusion profiles and models in various materials.
CO5	Describe the Metallization choices, properties and selection of optimum deposition process.

Course Name	Machine Learning with Python
Course Code	21EC734
CO1	Appreciate the importance of visualization in the data analytics solution
CO2	Apply structured thinking to unstructured problems
CO3	Understand a very broad collection of machine learning algorithms and problems
CO4	Learn algorithmic topics of machine learning and mathematically deep enough to introduce the required theory
CO5	Develop an appreciation for what is involved in learning from data.

Course Name	Multimedia Communication
Course Code	21EC735
CO1	Understand basics of different multimedia networks and applications.
CO2	Understand different compression techniques to compress audio and video.
CO3	Describe multimedia Communication across Networks.
CO4	Analyse different media types to represent them in digital form.
CO5	Compress different types of text and images using different compression techniques.

Course Name	Optical and Satellite Communication
Course Code	21EC741
CO1	Classification and characterization of optical fibers and devices used for optical communication.
CO2	Understand the principle of operation of optical devices used for multiplexing and amplification of light.
CO3	Describe the satellite orbits and its trajectories with the definitions of parameters associated with it.
CO4	Describe the electronic hardware systems associated with the satellite subsystem and earth station.
CO5	Understand the functioning of satellites for communication, remote sensing, and weather and navigation applications.

Course Name	ARM Embedded Systems
Course Code	21EC742
CO1	Describe the architectural features and instructions of 32bit microcontroller ARM Cortex M3.
CO2	Apply the knowledge gained for Programming ARM Cortex M3 for different applications.
CO3	Understand the basic hardware components and their selection method based on the characteristics and attributes of an embedded system
CO4	Develop the hardware and software co-design and firmware design approaches.
CO5	Explain the need of real time operating system for embedded system applications.

Course Name	Basic Digital Image Processing
Course Code	21EC743
CO1	Understand image formation and the role of human visual system plays in perception of gray and color image data.
CO2	Apply image processing techniques in spatial domains.
CO3	Apply image processing techniques in frequency (Fourier) domains.
CO4	Conduct independent study and analysis of Image Enhancement techniques.

Course Name	Basic Digital Signal Processing
Course Code	21EC744
CO1	Understand the continuous time and discrete time signals and systems, in time and frequency domain
CO2	Apply the concepts of signals and systems to obtain the desired parameter/representation
CO3	Design analog/digital filters to meet given specifications
CO4	Design and implement the analog filter using components/suitable simulation tools
CO5	Design and implement the digital filter (FIR/IIR) using suitable simulation tools, and record the input

Course Name	E-waste Management
Course Code	21EC745
CO1	1. Understand the existing discourse on e-waste and its management, statistics across the world, opportunities, and challenges w.r.t. regulatory framework, SDGs, CE, and LCIA (Life Cycle Impact Assessment) and MFA (Material Flow Analysis), Indian scenario.
CO2	2. Describe EPR, a regulatory framework for achieving specified goals across different countries and impacts on environment and human health.
CO3	3. Explain themes in the context of resource use and sustainable development. Urban mining, informal sector operations and need for resource use policy, financial support for recycling infrastructure building, etc. in Indian context and also explain to what extent – different aspects of e-waste management have been incorporated in the existing regulatory framework in comparison with international legislatures.
CO4	Identify and infer pan-Indian initiatives dealing with e-waste management, ranging from building knowledge base through research and social action by different stakeholders to technological and legal advancements, and industrial initiatives. Analyse roadmap for the Agenda 2030.
CO5	Use opportunities and challenges around four domains: legal and judicial domain; economic concerns; recycling culture/society; and environment concerns.