

Department of Electronics & Communication Engineering

2.6.1 Program Outcomes and Course Outcomes

Program Outcomes (POs)
PO1: Apply knowledge of computing fundamentals, computing specialization, mathematics and domain knowledge to provide IT solutions.
PO2: Identify, analyse and solve IT problems using fundamental principles of mathematics and computing sciences.
PO3: Design, Develop and evaluate software solutions to meet societal and environmental concerns.
PO4: Conduct investigations of complex problems using research based knowledge and methods to provide valid conclusions.
PO5: Select and apply appropriate techniques and modern tools for complex computing activities.
PO6: Practice and follow professional ethics and cyber regulations.
PO7: Involve in life-long learning for continual development as an IT professional.
PO8: Apply and demonstrate computing and management principles to manage projects in multidisciplinary environments by involving in different roles.
PO9: Comprehend& write effective reports and make quality presentations.
PO10: Understand and assess the impact of IT solutions on socio-environmental issues.
PO11: Work collaboratively as a member or leader in multidisciplinary teams.
PO12: Identify potential business opportunities and innovate to create value to the society and seize that opportunity.

Program Specific Outcomes (PSOs)
PSO1: Specify, design, build, test, apply and adapt the skill sets in analog, digital, embedded system programming, signal processing and semiconductor technologies to solve interdisciplinary challenges.
PSO2: Understand and architect wired and wireless networks, analog and digital communication systems as per specifications, and determine their performance through strong technical, social, ethical consciousness.

Course Outcomes:

Year/ Semester: 1st Year /1st Semester		Scheme of Study: 18-Scheme
Course Name : Calculus And Linear Algebra		Course Code: 18MATI1
CO1	Apply the knowledge of calculus to solve problems related to polar curves and its applications in determining the bendiness of a curve.	
CO2	Learn the notion of partial differentiation to calculate rates of change of multivariate functions and solve problems related to composite functions and Jacobians.	
CO3	Apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing the area and volumes.	
CO4	Solve first order linear/nonlinear differential equation analytically using standard methods	
CO5	Make use of matrix theory for solving system of linear equations and compute eigenvalues and eigenvectors required for matrix diagonalization process.	

Year/ Semester: 1st Year /1st Semester		Scheme of Study: 18-Scheme
COURSE NAME : ENGINEERING CHEMISTRY		Course Code: 18CHE12
CO1	Use of free energy in equilibria, rationalize bulk properties and processes using thermodynamic considerations, electrochemical energy systems	
CO2	Causes & effects of corrosion of metals and control of corrosion. Modification of surface properties of metals to develop resistance to corrosion, wear, tear impact etc. by electroplating and electroless plating.	
CO3	Production & consumption of energy for industrialization of country and living standards of people. Electrochemical and concentration cells. Classical, modern batteries and fuel cells. Utilization of solar energy for different useful forms of energy.	
CO4	Environmental pollution, waste management and water chemistry.	
CO5	Different techniques of instrumental methods of analysis. Fundamental principles of nano materials.	

Year/ Semester: 1st Year /1st Semester		Scheme of Study: 18-Scheme
Course Name : C PROGRAMMING FOR PROBLEM SOLVING		Course Code: 18CPS13
CO1	Illustrate simple algorithms from the different domains such as mathematics, physics, etc.	
CO2	Construct a programming solution to the given problem using C. Identify and correct the syntax and logical errors in C programs. Modularize the given problem using functions and structures.	
CO3	Illustrate simple algorithms from the different domains such as mathematics, physics, etc.	

CO4	Construct a programming solution to the given problem using C. Identify and correct the syntax and logical errors in C programs. Modularize the given problem using functions and structures.
CO5	Illustrate simple algorithms from the different domains such as mathematics, physics, etc.

Year/ Semester: 1 st Year /1 st Semester		Scheme of Study: 18-Scheme
COURSE NAME : BASIC ELECTRONICS		Course Code: 18ELN14
CO1	Describe the operation of diodes, BJT, FET and Operational Amplifiers.	
CO2	Design and explain the construction of rectifiers, regulators, amplifiers and oscillators.	
CO3	Describe general operating principles of SCRs and its application.	
CO4	Explain the working and design of Fixed voltage IC regulator using 7805 and Astable oscillator using Timer IC 555.	
CO5	Explain the different number system and their conversions and construct simple combinational and sequential logic circuits using Flip-Flops.	
CO6	Describe the basic principle of operation of communication system and mobile phones.	

Year/ Semester: 1 st Year /1 st Semester		Scheme of Study: 18-Scheme
COURSE NAME : ELEMENTS OF MECHANICAL ENGINEERING		Course Code: 18ME15
CO1	Identify different sources of energy and their conversion process.	
CO2	Explain the working principle of hydraulic turbines, pumps, IC engines and refrigeration.	
CO3	Recognize various metal joining processes and power transmission elements.	
CO4	Understand the properties of common engineering materials and their applications in engineering industry.	
CO5	Discuss the working of conventional machine tools, machining processes, tools and accessories.	

Year/ Semester: 1 st Year /1 st Semester		Scheme of Study: 18-Scheme
Course Name : ENGINEERING CHEMISTRY LABORATORY		Course Code: 18CHEL16
CO1	Handling different types of instruments for analysis of materials using small quantities of materials involved for quick and accurate results.	
CO2	Carrying out different types of titrations for estimation of concerned in materials using comparatively more quantities of materials involved for good results.	

Year/ Semester: 1st Year /1st Semester		Scheme of Study: 18-Scheme
Course Name : C PROGRAMMING LABORATORY		Course Code: 18CPL17
CO1	Write flowcharts, algorithms and programs.	
CO2	Familiarize the processes of debugging and execution. Implement basics of C programming language.	
CO3	Illustrate solutions to the laboratory programs.	

Year/ Semester: 1st Year /1st Semester		Scheme of Study: 18-Scheme
Course Name : TECHNICAL ENGLISH - I		Course Code: 18EGH18
CO1	Use grammatical English and essentials of language skills and identify the nuances of phonetics, intonation and flawless pronunciation	
CO2	Implement English vocabulary at command and language proficiency	
CO3	Identify common errors in spoken and written communication	
CO4	Understand and improve the non verbal communication and kinesics	
CO5	Perform well in campus recruitment, engineering and all other general	

Year/ Semester: 1st year /2nd semester		Scheme of Study: 18-Scheme
COURSE NAME : ADVANCED CALCULUS AND NUMERICAL METHODS		Course Code: 18MAT21
CO1	Illustrate the applications of multivariate calculus to understand the solenoidal and irrotational vectors and also exhibit the inter dependence of line, surface and volume integrals.	
CO2	Demonstrate various physical models through higher order differential equations and solve such linear ordinary differential equations.	
CO3	Construct a variety of partial differential equations and solution by exact methods/method of separation of variables.	
CO4	Explain the applications of infinite series and obtain series solution of ordinary differential equations.	
CO5	Apply the knowledge of numerical methods in the modeling of various physical and engineering phenomena.	

Year/ Semester: 1 st year /2 nd semester		Scheme of Study: 18-Scheme
Course Name : : ENGINEERING PHYSICS		Course Code: 18PHY22
CO1	Understand various types of oscillations and their implications, the role of Shock waves in various fields and recognize the elastic properties of materials for engineering applications.	
CO2	Realize the interrelation between time varying electric field and magnetic field, the transverse nature of the EM waves and their role in optical fiber communication.	
CO3	Compute Eigen values, Eigen functions, momentum of Atomic and subatomic particles using Time independent 1-D Schrodinger's wave equation.	
CO4	Apprehend theoretical background of laser, construction and working of different types of laser and its applications in different fields	
CO5	Understand various electrical and thermal properties of materials like conductors, semiconductors and dielectrics using different theoretical models.	

Year/ Semester: 1 st year /2 nd semester		Scheme of Study: 18-Scheme
Course Name : BASIC ELECTRICAL ENGINEERING		Course Code: 18ELE23
CO1	Analyze D.C and A.C circuits.	
CO2	Explain the principle of operation and construction of single phase transformers.	
CO3	Explain the principle of operation and construction of DC machines and synchronous machines.	
CO4	Explain the principle of operation and construction of three phase induction motors.	
CO5	Discuss concepts of electrical wiring, circuit protecting devices and earthing.	

Year/ Semester: 1 st year /2 nd semester		Scheme of Study: 18-Scheme
Course Name : ELEMENTS OF CIVIL ENGINEERING AND MECHANICS		Course Code: 18CIV24
CO1	Mention the applications of various fields of Civil Engineering.	
CO2	Compute the resultant of given force system subjected to various loads.	
CO3	Comprehend the action of Forces, Moments and other loads on systems of rigid bodies and compute the reactive forces that develop as a result of the external loads.	
CO4	Locate the Centroid and compute the Moment of Inertia of regular and built-up sections.	
CO5	Express the relationship between the motion of bodies and analyze the bodies in motion.	

Year/ Semester: 1st year /2nd semester		Scheme of Study: 18-Scheme
Course Name : ENGINEERING GRAPHICS		Course Code: 18EGDL25
CO1	Prepare engineering drawings as per BIS conventions mentioned in the relevant codes.	
CO2	Produce computer generated drawings using CAD software.	
CO3	Use the knowledge of orthographic projections to represent engineering information/ concepts and present the same in the form of drawings.	
CO4	Develop isometric drawings of simple objects reading the orthographic projections of those objects.	
CO5	Convert pictorial and isometric views of simple objects to orthographic views.	

Year/ Semester: 1st year /2nd semester		Scheme of Study: 18-Scheme
Course Name : ENGINEERING PHYSICS LABORATORY		Course Code: 18PHYL26
CO1	Apprehend the concepts of interference of light, diffraction of light, Fermi energy and magnetic effect of current	
CO2	Understand the principles of operations of optical fibers and semiconductor devices such as Photodiode, and NPN transistor using simple circuits	
CO3	Determine elastic moduli and moment of inertia of given materials with the help of suggested procedures	
CO4	Recognize the resonance concept and its practical applications	
CO5	Understand the importance of measurement procedure, honest recording and representing the data, reproduction of final results	

Year/ Semester: 1st year /2nd semester		Scheme of Study: 18-Scheme
Course Name : BASIC ELECTRICAL ENGINEERING LABORATORY		Course Code: 18ELEL27
CO1	Identify the common electrical components and measuring instruments used for conducting experiments in the electrical laboratory.	
CO2	Compare power factor of lamps.	
CO3	Determine impedance of an electrical circuit and power consumed in a 3 phase load.	
CO4	Determine earth resistance and understand two way and three way control of lamps.	
CO5	Identify the common electrical components and measuring instruments used for conducting experiments in the electrical laboratory.	

Year/ Semester: 1st year /2nd semester		Scheme of Study: 18-Scheme
Course Name : TECHNICAL ENGLISH - II		Course Code: 18EGH28
CO1	Identify common errors in spoken and written communication	
CO2	Get familiarized with English vocabulary and language proficiency	
CO3	Improve nature and style of sensible writing and acquire employment and workplace communication skills	
CO4	Improve their Technical Communication Skills through Technical Reading and Writing practices	
CO5	Perform well in campus recruitment, engineering and all other general competitive examinations	

Year/ Semester: 2nd Year /3rd Semester		Scheme of Study: 18-Scheme
Course Name : TRANSFORM CALCULUS, FOURIER SERIES AND NUMERICAL TECHNIQUES		Course Code: 18MAT31
CO1	Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.	
CO2	Demonstrate Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory.	
CO3	Make use of Fourier transform and Z-transform to illustrate discrete/ continuous function arising in wave and heat propagation, signals and systems.	
CO4	Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.	
CO5	Determine the extremals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.	

Year/ Semester: 2nd Year /3rd Semester		Scheme of Study: 18-Scheme
Course Name : NETWORK THEORY		Course Code: 18EC32
CO1	Determine currents and voltages using source transformation/ source shifting/ mesh/ nodal analysis and reduce given network using star-delta transformation/source transformation/ source shifting.	
CO2	Solve network problems by applying Superposition/ Reciprocity/ Thevenin's/ Norton's/ Maximum Power Transfer/ Millman's Network Theorems and electrical laws to reduce circuit complexities and to arrive at feasible solutions.	
CO3	Calculate current and voltages for the given circuit under transient conditions and Apply Laplace transform to solve the given network.	

CO4	Solve the given network using specified two port network parameters - Z, Y,T&h.
CO5	Understand the concept of resonance and determine the parameters that characterize series/parallel Resonant Circuits.

Year/ Semester: 2nd Year /3rd Semester		Scheme of Study: 18-Scheme
Course Name : ELECTRONIC DEVICES		Course Code: 18EC33
CO1	Understand the principles of semiconductor Physics	
CO2	Understand the principles and characteristics of different types of semiconductor devices	
CO3	Understand the fabrication process of semiconductor devices.	
CO4	Utilize the mathematical models of semiconductor junctions for circuits and systems.	
CO5	Utilize the mathematical models of semiconductor junctions and MOS transistors for circuits and systems.	

Year/ Semester: 2nd Year /3rd Semester		Scheme of Study: 18-Scheme
Course Name : DIGITAL SYSTEM DESIGN		Course Code: 18EC34
CO1	Explain the concept of combinational and sequential logic circuits.	
CO2	Analyze and Design the combinational logic circuits.	
CO3	Describe and characterize flip-flops and its applications.	
CO4	Design the sequential circuits using SR, JK, D, T flip-flops and Mealy & Moore machines.	
CO5	Design applications of Combinational & Sequential Circuits.	

Year/ Semester: 2nd Year /3rd Semester		Scheme of Study: 18-Scheme
Course Name : COMPUTER ORGANIZATION AND ARCHITECTURE		Course Code: 18EC35
CO1	Explain the basic organization of a computer system.	
CO2	Describe the addressing modes, instruction formats and program control statement.	
CO3	Explain different ways of accessing an input/ output device including interrupts.	
CO4	Illustrate the organization of different types of semiconductor and other secondary storage memories.	
CO5	Illustrate simple processor organization based on hardwired control and micro	

	programmed control.
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Year/ Semester: 2 nd Year /3 rd Semester		Scheme of Study: 18-Scheme
Course Name : POWER ELECTRONICS AND INSTRUMENTATION		Course Code: 18EC36
CO1	Build and test circuits using power electronic devices.	
CO2	Analyze and design controlled rectifier, DC to DC converters, DC to AC inverters and SMPS.	
CO3	Analyze instrument characteristics and errors.	
CO4	Describe the principle of operation and develop circuits for multi range Ammeters, Voltmeters and Bridges to measure passive component values and frequency.	
CO5	Explain the principle, design and analyze the transducers for measuring physical parameters	

Year/ Semester: 2 nd Year /3 rd Semester		Scheme of Study: 18-Scheme
Course Name : Electronic Devices And Instrumentation Laboratory		Course Code: 18ECL37
CO1	Recognize and demonstrate functioning of semiconductor power devices.	
CO2	Evaluate the characteristics, switching, power conversion and control by semiconductor power devices.	
CO3	Analyze the response and plot the characteristics of transducers such as LDR, Photo diode, etc.	
CO4	Design and test simple electronic circuits for measurement of temperature and resistance.	
CO5	Use circuit simulation software for the implementation and characterization of electronic circuits and devices.	

Year/ Semester: 2 nd Year /3 rd Semester		Scheme of Study: 18-Scheme
Course Name : DIGITAL SYSTEM DESIGN LABORATORY		Course Code: 18ECL38
CO1	Design, realize and verify De Morgan's Theorem, SOP, POS forms	
CO2	Demonstrate the truth table of various expressions and combinational circuits using logic gates.	
CO3	Design various combinational circuits such as adders, subtractors, comparators, multiplexers and demultiplexers.	

CO4	Construct flips-flops, counters and shift registers.
CO5	Simulate Serial adder and Binary Multiplier.

Year/ Semester: 2 nd Year /4 th Semester		Scheme of Study: 18-Scheme
Course Name : ADDITIONAL MATHEMATICS- I		Course Code: 18MATDIP3I
CO1	Apply concepts of complex numbers and vector algebra to analyze the problems arising in related area.	
CO2	Use derivatives and partial derivatives to calculate rate of change of multivariate functions.	
CO3	Analyze position, velocity and acceleration in two and three dimensions of vector valued functions.	
CO4	Learn techniques of integration including the evaluation of double and triple integrals.	
CO5	Identify and solve first order ordinary differential equations.	

Year/ Semester: 2 nd Year /4 th Semester		Scheme of Study: 18-Scheme
Course Name : COMPLEX ANALYSIS, PROBABILITY AND STATISTICAL METHODS		Course Code: 18MAT41
CO1	Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory.	
CO2	Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing.	
CO3	Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field.	
CO4	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.	
CO5	Construct joint probability distributions and demonstrate the validity of testing the hypothesis.	

Year/ Semester: 2 nd Year /4 th Semester		Scheme of Study: 18-Scheme
Course Name : Analog Circuits		Course Code: 18EC42
CO1	Understand the characteristics of BJTs and FETs.	
CO2	Design and analyze BJT and FET amplifier circuits.	
CO3	Design sinusoidal and non-sinusoidal oscillators.	
CO4	Understand the functioning of linear ICs.	
CO5	Design of Linear IC based circuits.	

Year/ Semester: 2nd Year /4th Semester		Scheme of Study: 18-Scheme
Course Name : CONTROL SYSTEMS		Course Code: 18EC43
CO1	Develop the mathematical model of mechanical and electrical systems.	
CO2	Develop transfer function for a given control system using block diagram reduction techniques and signal flow graph method.	
CO3	Determine the time domain specifications for first and second order systems.	
CO4	Determine the stability of a system in the time domain using Routh- Hurwitz criterion and Root-locus technique.	
CO5	Determine the s stability of a system in the frequency domain using Nyquist and bode plots.	

Year/ Semester: 2nd Year /4th Semester		Scheme of Study: 18-Scheme
Course Name : ENGINEERING STATISTICS AND LINEAR ALGEBRA		Course Code: 18EC44
CO1	Analyze and evaluate single and multiple random variables.	
CO2	Identify and associate Random Variables and Random Processes in Communication events.	
CO3	Analyze and model the Random events in typical communication events to extract quantitative statistical parameters.	
CO4	Analyze and model typical signal sets in terms of a basis function set of Amplitude, phase and frequency.	
CO5	Demonstrate by way of simulation or emulation the ease of analysis employing basis functions, statistical representation and Eigen values.	

Year/ Semester: 2nd Year /4th Semester		Scheme of Study: 18-Scheme
Course Name : SIGNALS AND SYSTEMS		Course Code: 18EC45
CO1	Analyze the different types of signals and systems.	
CO2	Determine the linearity, causality, time-invariance and stability proper- ties of continuous and discrete time systems.	
CO3	Evaluate the convolution sum and integral.	
CO4	Represent continuous and discrete signals & systems in frequency domain using Fourier representations.	
CO5	Analyze discrete time signals and systems using Z-transforms.	

Year/ Semester: 2nd Year /4th Semester		Scheme of Study: 18-Scheme
Course Name : MICROCONTROLLER		Course Code: 18EC46
CO1	Explain the difference between Microprocessors & Microcontrollers, Architecture of 8051 Microcontroller, Interfacing of 8051 to external memory and Instruction set of 8051.	
CO2	Write 8051 Assembly level programs using 8051 instruction set.	
CO3	Explain the Interrupt system, operation of Timers/Counters and Serial port of 8051.	
CO4	Write 8051 Assembly 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 port.	
CO5	Interface simple switches, simple LEDs, ADC 0804, LCD and Stepper Motor to 8051 using 8051 I/O ports.	

Year/ Semester: 2nd Year /4th Semester		Scheme of Study: 18-Scheme
Course Name : MICROCONTROLLER LABORATORY		Course Code: 18ECL47
CO1	Enhance programming skills using Assembly language and C.	
CO2	Write Assembly language programs in 8051 for solving simple problems that manipulate input data using different instructions of 8051.	
CO3	Interface different input and output devices to 8051 and control them using Assembly language programs.	
CO4	Interface the serial devices to 8051 and do the serial transfer using C programming.	
CO5	Develop applications based on Microcontroller 8051.	

Year/ Semester: 2nd Year /4th Semester		Scheme of Study: 18-Scheme
Course Name : ANALOG CIRCUITS LABORATORY		Course Code: 18ECL48
CO1	Analyze Frequency response of JFET/MOSFET amplifier.	
CO2	Design BJT/FETs amplifier with and without feedback and evaluate their performance characteristics.	
CO3	Apply the knowledge gained in the design of BJT/FET circuits in Oscillators.	
CO4	Design analog circuits using OPAMPs for different applications.	
CO5	Simulate and analyze analog circuits that use ICs for different electronic applications.	

Year/ Semester: 2nd Year /4th Semester		Scheme of Study: 18-Scheme
Course Name : ADDITIONAL MATHEMATICS-11		Course Code: 18MATDIP41
CO1	Solve systems of linear equations using matrix algebra.	
CO2	Apply the knowledge of numerical methods in modelling and solving engineering problems.	
CO3	Make use of analytical methods to solve higher order differential equations.	
CO4	Classify partial differential equations and solve them by exact methods.	
CO5	Apply elementary probability theory and solve related problems.	

Year/ Semester: 3rd Year /5th Semester		Scheme of Study: 18-Scheme
Course Name : TECHNOLOGICAL INNOVATION MANAGEMENT AND ENTREPRENEURSHIP		Course Code: 18ES51
CO1	Understand the fundamental concepts of Management and Entrepreneurship and opportunities in order to setup a business	
CO2	Identify the various organizations' architecture	
CO3	Describe the functions of Managers, Entrepreneurs and their social responsibilities	
CO4	Understand the components in developing a business plan	
CO5	Recognize the various sources of funding and institutions supporting	

Year/ Semester: 3rd Year /5th Semester		Scheme of Study: 18-Scheme
Course Name : DIGITAL SIGNAL PROCESSING		Course Code: 18EC52
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 and linear filtering approach.	
CO4	Design and realize FIR and IIR digital filters.	
CO5	Understand the DSP processor architecture.	

Year/ Semester: 3rd Year /5th Semester		Scheme of Study: 18-Scheme
Course Name : PRINCIPLES OF COMMUNICATION SYSTEMS		Course Code: 18EC53
CO1	Analyze and compute performance of AM and FM modulation in the presence of noise at the receiver.	
CO2	Analyze and compute performance of digital formatting processes with quantization noise.	
CO3	Multiplex digitally formatted signals at Transmitter.	
CO4	Demultiplex the signals and reconstruct digitally formatted signals at the receiver.	
CO5	Design /Demonstrate the use of digital formatting in Multiplexers, Vocoder and Video transmission.	

Year/ Semester: 3rd Year /5th Semester		Scheme of Study: 18-Scheme
Course Name : INFORMATION THEORY AND CODING		Course Code: 18EC54
CO1	Explain concept of Dependent & Independent Source, measure of information, Entropy, Rate of information and Order of a source	
CO2	Represent the information using Shannon Encoding, Shannon Fano Prefix and Huffman Encoding Algorithms	
CO3	Model the continuous and discrete communication channels using input, output and joint probabilities	
CO4	Determine a code word comprising of the check bits computed using Linear Block codes, cyclic codes & convolutional codes	
CO5	Design the encoding and decoding circuits for Linear Block codes, cyclic codes, convolutional codes, BCH and Golay codes.	

Year/ Semester: 3rd Year /5th Semester		Scheme of Study: 18-Scheme
Course Name : ELECTROMAGNETIC WAVES		Course Code: 18EC55
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 equation and Apply Biot-Savart's and Ampere's laws for evaluating Magnetic field for different current configurations	

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

Year/ Semester: 3 rd Year /5 th Semester		Scheme of Study: 18-Scheme
Course Name : VERILOG HDL		Course Code: 18EC56
CO1	Write Verilog programs in gate, dataflow (RTL), behavioral and switch modeling levels of Abstraction.	
CO2	Design and verify the functionality of digital circuit/system using test benches.	
CO3	Identify the suitable Abstraction level for a particular digital design.	
CO4	Write the programs more effectively using Verilog tasks, functions and directives.	
CO5	Perform timing and delay Simulation and Interpret the various constructs in logic synthesis.	

Year/ Semester: 3 rd Year /5 th Semester		Scheme of Study: 18-Scheme
Course Name : DIGITAL SIGNAL PROCESSING LABORATORY		Course Code: 18ECL57
CO1	Understand the concepts of analog to digital conversion of signals and frequency domain sampling of signals.	
CO2	Model the discrete time signals and systems and verify its properties and results.	
CO3	Implement discrete computations using DSP processor and verify the results.	
CO4	Realize the digital filters using a simulation tool and analyze the response of the filter for an audio signal.	
CO5	Write programs using Matlab/ Scilab/Octave to illustrate DSP concepts.	

Year/ Semester: 3 rd Year /5 th Semester		Scheme of Study: 18-Scheme
Course Name : HDL LABORATORY		Course Code: 18ECL58
CO1	Write the Verilog NHDL programs to simulate Combinational circuits in Dataflow, Behavioral and Gate level Abstractions.	
CO2	Describe sequential circuits like flip flops and counters in Behavioral description and obtain simulation waveforms.	
CO3	Use FPGA/CPLD kits for down loading Verilog codes and check output.	
CO4	Synthesize Combinational and Sequential circuits on programmable ICs and test the	

	hardware.
CO5	Interface the hardware to the programmable chips and obtain the required

Year/ Semester: 3rd Year /5th Semester		Scheme of Study: 18-Scheme
Course Name: ENVIRONMENTAL STUDIES		Course Code: 18CIV59
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 components.	
CO4	Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues.	
CO5	Relate to the latest Developments in Environmental Pollution Mitigation Tools.	

Year/ Semester: 3rd Year /6th Semester		Scheme of Study: 18-Scheme
Course Name: DIGITAL COMMUNICATION		Course Code: 18EC61
CO1	Associate and apply the concepts of Band pass sampling to well specified signals and channels.	
CO2	Analyze and compute performance parameters and transfer rates for low pass and band pass symbol under ideal and corrupted non band limited channels.	
CO3	Test and validate symbol processing and performance parameters at the receiver under ideal and corrupted band limited channels.	
CO4	Demonstrate that band pass signals subjected to corruption and distortion in a band limited channel can be processed at the receiver to meet specified performance criteria.	
CO5	Understand the principles of spread spectrum communications.	

Year/ Semester: 3rd Year /6th Semester		Scheme of Study: 18-Scheme
Course Name: EMBEDDED SYSTEMS		Course Code: 18EC62
CO1	Describe the architectural features and instructions of 32 bit microcontroller ARM CortexM3.	
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 software co-design and firmware design approaches.
CO5	Explain the need of real time operating system for embedded system applications.

Year/ Semester: 3rd Year /6th Semester		Scheme of Study: 18-Scheme
Course Name: MICROWAVE AND ANTENNAS		Course Code: 18EC63
CO1	Describe the use and advantages of microwave transmission	
CO2	Analyze various parameters related to microwave transmission lines and waveguides	
CO3	Identify microwave devices for several applications	
CO4	Analyze various antenna parameters necessary for building a RF system	
CO5	Recommend various antenna configurations according to the applications.	

Year/ Semester: 3rd Year /6th Semester		Scheme of Study: 18-Scheme
Course Name: OPERATING SYSTEM		Course Code: 18EC641
CO1	Explain the goals, structure, operation and types of operating systems.	
CO2	Apply scheduling techniques to find performance factors.	
CO3	Explain organization of file systems and IOCS.	
CO4	Apply suitable techniques for contiguous and non-contiguous memory allocation.	
CO5	Describe message passing, deadlock detection and prevention methods.	

Year/ Semester: 3rd Year /6th Semester		Scheme of Study: 18-Scheme
Course Name: PYTHON APPLICATION PROGRAMMING		Course Code: 18EC646
CO1	Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.	
CO2	Demonstrate proficiency in handling Strings and File Systems.	
CO3	Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.	
CO4	Interpret the concepts of Object-Oriented Programming as used in Python.	

CO5	Implement exemplary applications related to Network Programming, Web Services and Databases in Python.
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Year/ Semester: 3 rd Year /6 th Semester		Scheme of Study: 18-Scheme
Course Name: EMBEDDED SYSTEMS LABORATORY		Course Code: 18ECL66
CO1	Understand the instruction set of 32 bit microcontroller ARM Cortex M3, and the software tool required for programming in Assembly and C language.	
CO2	Develop assembly language programs using ARM Cortex M3 for different applications.	
CO3	Interface external devices and I/O with ARM Cortex M3.	
CO4	Develop C language programs and library functions for embedded system applications.	
CO5	Analyze the functions of various peripherals, peripheral registers and power saving modes of ARM Cortex M3	

Year/ Semester: 3 rd Year /6 th Semester		Scheme of Study: 18-Scheme
Course Name: MICROCONTROLLERS		Course Code: 18EC654
CO1	Explain the basics of Microprocessor and Microcontroller	
CO2	Relate to the 8051 Microcontroller architecture and Pin description	
CO3	Analyze 8051 Addressing modes and use the 8051 instruction set	
CO4	Program the on-chip peripherals in 8051	
CO5	Design and develop applications using 8051 Assembly language and C program	

Year/ Semester: 3 rd Year /6 th Semester		Scheme of Study: 18-Scheme
Course Name: COMMUNICATION LABORATORY		Course Code: 18ECL67
CO1	Design and test circuits for analog modulation and demodulation schemes viz., AM, FM, etc.	
CO2	Determine the characteristics and response of microwave waveguide.	
CO3	Determine characteristics of micro strip antennas and devices & compute the parameters associated with it.	
CO4	Design and test the digital and analog modulation circuits and display the waveforms.	
CO5	Simulate the digital modulation systems and compare the error performance of basic digital	

	modulation schemes.
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Year/ Semester: 4 th Year /7 th Semester		Scheme of Study: 18-Scheme
Course Name: COMPUTER NETWORKS		Course Code: 18EC71
CO1	Understand the concepts of networking.	
CO2	Describe the various networking architectures.	
CO3	Identify the protocols and services of different layers.	
CO4	Distinguish the basic network configurations and standards associated with each network.	
CO5	Analyze a simple network and measure its parameters.	

Year/ Semester: 4 th Year /7 th Semester		Scheme of Study: 18-Scheme
Course Name: VLSI DESIGN		Course Code: 18EC72
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	Demonstrate ability to design Combinational, sequential and dynamic logic circuits as per the requirements	
CO4	Interpret Memory elements along with timing considerations	
CO5	Interpret testing and testability issues in VLSI Design	

Year/ Semester: 4 th Year /7 th Semester		Scheme of Study: 18-Scheme
Course Name: DIGITAL IMAGE PROCESSING		Course Code: 18EC733
CO1	Describe the fundamentals of digital image processing.	
CO2	Understand image formation and the role human visual system plays in perception of gray and color image data.	
CO3	Apply image processing techniques in both the spatial and frequency (Fourier) domains.	
CO4	Design and evaluate image analysis techniques	
CO5	Conduct independent study and analysis of image Enhancement and restoration techniques.	

Year/ Semester: 4th Year /7th Semester		Scheme of Study: 18-Scheme
Course Name: ELECTIVE MULTIMEDIA COMMUNICATION (MMC)		Course Code: 18EC743
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	Analyze different media types to represent them in digital form.	
CO5	Compress different types of text and images using different compression techniques.	

Year/ Semester: 4th Year /7th Semester		Scheme of Study: 18-Scheme
Course Name: INTRODUCTION TO ARTIFICIAL INTELLIGENCE (OPEN ELECTIVE)		Course Code: 18CS753
CO1	Identify the AI based problems	
CO2	Apply techniques to solve the AI problems	
CO3	Define learning and explain various learning techniques	
CO4	Discuss on expert systems	
CO5	Identify the AI based problems	

Year/ Semester: 4th Year /7th Semester		Scheme of Study: 18-Scheme
Course Name: COMPUTER NETWORKS LAB		Course Code: 18ECL76
CO1	Choose suitable tools to model a network.	
CO2	Use the network simulator for learning and practice of networking algorithms.	
CO3	Illustrate the operations of network protocols and algorithms using C programming.	
CO4	Simulate the network with different configurations to measure the performance parameters.	
CO5	Implement the data link and routing protocols using C programming.	

Year/ Semester: 4th Year /7th Semester		Scheme of Study: 18-Scheme
Course Name: VLSI LABORATORY		Course Code: 18ECL77
CO1	Choose suitable tools to model a network.	
CO2	Use the network simulator for learning and practice of networking algorithms.	
CO3	Illustrate the operations of network protocols and algorithms using C programming.	
CO4	Simulate the network with different configurations to measure the performance parameters.	
CO5	Implement the data link and routing protocols using C programming.	

Year/ Semester: 4th Year /7th Semester		Scheme of Study: 18-Scheme
Course Name: PROJECT WORK PHASE– I + PROJECT WORK SEMINAR (PWP)		Course Code: 18ECP78
CO1	Identify, formulate and analyze engineering problems for the need of society.	
CO2	Conduct a Survey of Several available literature in the preferred field of study.	
CO3	Compare and contrast the several existing solutions.	
CO4	Demonstrate an ability to work in teams and manage the conduct of the research study.	
CO5	Formulate and purpose a plan for creating a solution for the research plan identified and to report and present the findings of the study conducted in the preferred domain.	

Year/ Semester: 4th Year /8th Semester		Scheme of Study: 18-Scheme
Course Name: Wireless And Cellular Communication		Course Code: 18EC81
CO1	Understand the Communication theory both Physical and networking associated with GSM, CDMA & LTE 4G systems.	
CO2	Explain concepts of propagation mechanisms like Reflection, Diffraction, Scattering in wireless channels.	
CO3	Develop a scheme for idle mode, call set up, call progress handling and call tear down in a GSM cellular network.	
CO4	Understand the Communication theory both Physical and networking associated with GSM, CDMA & LTE 4G systems.	
CO5	Explain concepts of propagation mechanisms like Reflection, Diffraction, Scattering in wireless channels.	

Year/ Semester: 4th Year /8th Semester		Scheme of Study: 18-Scheme
Course Name: OPTICAL COMMUNICATION NETWORKS		Course Code: 18EC824
CO1	Classify and describe working of optical fiber with different modes of signal propagation.	
CO2	Describe the transmission characteristics and losses in optical fiber communication.	
CO3	Describe the construction and working principle of optical connectors, multiplexers and amplifiers.	
CO4	Describe the constructional features and the characteristics of optical Sources and detectors.	
CO5	Illustrate the networking aspects of optical fiber and describe various standards associated with it.	

Year/ Semester: 4 th Year /8 th Semester		Scheme of Study: 18-Scheme
Course Name: PROJECT WORK		Course Code: 18ECP83
CO1	Identify, formulate and analyze engineering problems for the need of society.	
CO2	Conduct a Survey of Several available literature in the preferred field of study.	
CO3	Compare and contrast the several existing solutions.	
CO4	Demonstrate an ability to work in teams and manage the conduct of the research study.	
CO5	Formulate and purpose a plan for creating a solution for the research plan identified and to report and present the findings of the study conducted in the preferred domain.	

Year/ Semester: 4 th Year /8 th Semester		Scheme of Study: 18-Scheme
Course Name: Technical Seminar		Course Code: 18ECS84
CO1	Able to apply gained knowledge and skills in engineering practice	
CO2	Able to analyze and design solutions for engineering problems	
CO3	Able to work individually, in team and communicate effectively through reports and presentations	
CO5	Able to demonstrate and adapt to workplace attitude and ethics	

Year/ Semester: 4 th Year /8 th Semester		Scheme of Study: 18-Scheme
Course Name: Internship		Course Code: 18ECI85
CO1	Able to apply gained knowledge and skills in engineering practice.	
CO2	Able to analyze and design solutions for engineering problems.	
CO3	Able to work individually, in team and communicate effectively through reports and presentations.	
CO5	Able to demonstrate and adapt to workplace attitude and ethics.	