DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
COURSE OUTCOMES
BATCH 2018-2022(R18)

YEAR/ SEM	S.no	**Course code**	**Code**	**Subject name**
I-YEAR I-SEM	1	MA101BS	C101	Mathematics- I
	2	AP102BS	C102	Applied Physics
	3	CS103ES	C103	Programming for Problem Solving
	4	ME104ES	C104	Engineering Graphics
	5	AP105BS	C105	Applied Physics Lab
	6	CS106ES	C106	Programming for Problem Solving Lab
I-YEAR II-SEM	7	MA201BS	C107	Mathematics - II
	8	CH202BS	C108	Chemistry
	9	EE203ES	C109	Basic Electrical Engineering
	10	ME205ES	C110	Engineering Workshop
	11	EN205HS	C111	English
	12	CH206BS	C112	Engineering Chemistry Lab
	13	EN207HS	C113	English Language and Communication Skills Lab
	14	EE208ES	C114	Basic Electrical Engineering Lab
II-YEARI-SEM	15	EC301PC	C201	Electronic Devices and Circuits
	16	EC302PC	C202	Network Analysis and Transmission Lines
	17	EC303PC	C203	Digital System Design
	18	EC304PC	C204	Signals and Systems
	19	EC305ES	C205	Probability Theory and Stochastic Processes
	20	EC306PC	C206	Electronic Devices and Circuits Lab
	21	EC307PC	C207	Digital System Design Lab
	22	EC308ES	C208	Basic Simulation Lab
II-YEARI	23	MA401BS	C209	Laplace Transforms, Numerical Methods & Complex Variables
	24	EC402PC	C210	Electromagnetic Fields and Waves

	25	EC403PC	C211	Analog and Digital Communications
	26	EC404PC	C212	Linear IC Applications
	27	EC405PC	C213	Electronic Circuit Analysis
	28	EC406PC	C214	Analog and Digital Communications Lab
	29	EC407PC	C215	IC Applications Lab
	30	EC408PC	C216	Electronic Circuit Analysis Lab
III-YEAR I-SEM	31	EC501PC	C301	Microprocessors & Microcontrollers
	32	EC502PC	C302	Data Communications and Networks
	33	EC503PC	C303	Control Systems
	34	SM504MS	C304	Business Economics & Financial Analysis
	35	EC511PE	C305	Computer Organization & Operating Systems
	36	EC505PC	C306	Microprocessors & Microcontrollers Lab
	37	EC506PC	C307	Data Communications and Networks Lab
	38	EN508HS	C308	Advanced Communication Skills Lab
III-YEAR II-SEM	39	EC601PC	C309	Antennas and Propagation
	40	EC602PC	C310	Digital Signal Processing
	41	EC603PC	C311	VLSI Design
	42	EC613PE	C312	Embedded System Design
	43	EI600OE	C313	Basics of Sensors Technology
	44	EC604PC	C314	Digital Signal Processing Lab
	45	EC605PC	C315	e – CAD Lab
	46	EC606PC	C316	Scripting Languages Lab
IV-YEAR I-SEM	47	EC701PC	C401	Microwave and Optical Communications
	48	EC713PE	C402	Digital Image Processing
	49	EC722PE	C403	Database Management Systems
	50	CE700OE	C404	Remote Sensing & GIS
	51	SM702MS	C405	Professional Practice, Law & Ethics
	52	EC703PC	C406	Microwave and Optical Communications Lab

	53	EC704PC	C407	Industrial Oriented Mini Project/ Summer Internship
	54	EC705PC	C408	Seminar
	55	EC706PC	C409	Project Stage - I
IV-YEAR II-SEM	56	EC813PE	C410	Wireless Sensor Networks
	57	EC821PE	C411	System on Chip Architecture
	58	CS800OE	C412	Machine Learning
	59	EC801PC	C413	Project Stage - II

Course Outcomes (COs)

Course Outcomes (Cos) all subjects for the Batch 2018-2022

R18 REGULATION

SEM: **III**	Subject Name: Electronic Devices and Circuits (C201)
C201.1	Able to Understand the application of diode.
C201.2	Able to Understand the characteristics of BJT and Biasing of BJT
C201.3	Able to Understand the characteristics of FET and some special purpose Devices
C201.4	Able to Design and analyze small signal amplifier circuits using BJT
C201.5	Able to Design and analyze small signal amplifier circuits using FET

SEM: **III**	Subject Name: Network Analysis and Transmission Lines (C202)
C202.1	Able to Gain the knowledge on basic RLC circuits behavior.
C202.2	Able to Analyze the Steady state and transient analysis of RLC Circuits.
C202.3	Able to Know the characteristics of two port network parameters.
C202.4	Able to Analyze the transmission line parameters.
C202.5	Able to Analyze the transmission line Configurations.

SEM: **III**	Subject Name: Digital System Design (C203)
C203.1	Able to Understand the numerical information in different forms and Boolean Algebra theorems
C203.2	Able to Postulates of Boolean algebra and to minimize combinational functions
C203.3	Able to Design and analyze combinational circuits
C203.4	Able to Design and analyze sequential circuits
C203.5	Able to Known about the logic families and realization of logic gates.

SEM III	Subject Name: Signals and Systems (C204)
C204.1	Able to Differentiate various signal functions.
C204.2	Able to Represent any arbitrary signal in time and frequency domain.

C204.3	Able to Understand the characteristics of linear time invariant systems.
C204.4	Able to Analyze the signals with different transform technique.
C204.5	Able to understand the Sampling theorem and its effects.

SEM III	Subject Name: Probability Theory and Stochastic Processes (C205)
C205.1	Able to Understand the concepts of Random Process and its Characteristics.
C205.2	Able to Understand the response of linear time Invariant system for a Random Processes.
C205.3	Able to Determine the temporal characteristics of Random Signals.
C205.4	Able to Determine the Spectral characteristics of Random Signals.
C205.5	Able to Understand the concepts of Noise in Communication systems.

SEM III	Subject Name: Electronics Devices and Circuits Lab(C206)
C206.1	Able to identify components and testing
C206.2	Able learn the characteristics of various active devices.
C206.3	Able to analyze various active devices
C206.4	Able to Apply various devices to real-time problems
C206.5	Able to Compute frequency response of various amplifiers

SEM III	Subject Name: Digital System Design Lab (C207)
C207.1	Able to design combinational circuits using logic gates
C207.2	Able to design registers and counters using flip flops
C207.3	Able to design Finite state machines
C207.4	Able to Identify Learn about Different Digital IC's
C207.5	Able to Differentiate IC's according to their Logic Families

SEM III	Subject Name: Basic Simulation Lab (C208)
C208.1	Able to generate various signals and sequences and perform basic operations.

C208.2	Able to calculate convolution, correlation between signals and sequences.
C208.3	Able to understand the properties of LTI system.
C208.4	Able to apply the concepts FS, FT, LT, Z-T.
C208.5	Able to generate Gaussian noise and analyze the importance of random process. Verify sampling theorem.

SEM IV	Subject Name: Laplace Transforms, Numerical Methods & Complex Variables(C209)
C209.1	Able to Use the Laplace transforms techniques for solving ODE's
C209.2	Able to Estimate the value for the given data using interpolation
C209.3	Able to Find the numerical solutions for a given ODE's
C209.4	Able to Analyze the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems.
C209.5	Able to Taylor's and Laurent's series expansions of complex Function.

SEMIV	Subject Name: Electromagnetic Fields and Waves(C210)
C210.1	Able to Get the knowledge of Basic Laws, Concepts and proofs related to Electrostatic Fields.
C210.2	Able to Get the knowledge of Basic Laws, Concepts and proofs related to Magnetostatic Fields.
C210.3	Able to Distinguish between the static and time-varying fields, establish the corresponding sets of Maxwell's Equations and Boundary Conditions.
C210.4	Able to Analyze the Wave Equations for good conductors, good dielectrics and evaluate the UPW Characteristics for several practical media of interest.
C210.5	Able to analyze completely the rectangular waveguides, their mode characteristics, and design waveguides for solving practical problems.

SEMIV	Subject Name: Analog and Digital Communications (C211)
C211.1	Able to Analyze and design of various continuous wave and angle modulation and demodulation techniques
C211.2	Able to Understand the effect of noise present in continuous wave and angle modulation techniques.
C211.3	Able to Attain the knowledge about AM, FM Transmitters and Receivers.
C211.4	Able to Analyze and design the various Pulse Modulation Techniques.
C211.5	Able to Understand the concepts of Digital Modulation Techniques and Baseband transmission.

SEM IV	Subject Name: Linear IC Applications (C212)

C212.1	A thorough understanding of operational amplifier IC 741.
C212.2	A thorough understanding of operational amplifiers Applications.
C212.3	A thorough understanding of operational amplifiers with linear integrated circuits.
C212.4	Able to Attain the knowledge of functional diagrams and applications of IC 555 and IC 565
C212.5	Able to Acquire the knowledge about the Data converters.

SEM IV	Subject Name : Electronic Circuit Analysis (C213)
C213.1	Able to Design the multistage amplifiers and understand the concepts of High Frequency Analysis of Transistors.
C213.2	Able to Utilize the Concepts of negative feedback to improve the stability of amplifiers
C213.3	Able to Design and analyze sustained oscillations using positive feedback.
C213.4	Able to Design and realize different classes of Power Amplifiers and tuned amplifiers useable for audio and Radio applications.
C213.5	Able to Design Multivibrators and sweep circuits for various applications

SEM IV	Subject Name: Analog and Digital Communications Lab (C214)
C214.1	Able to Study the concepts of Frequency Division Multiplexing.
C214.2	Able to Understand the designing of Digital Modulation techniques.
C214.3	Able to Gain hands on experience in Simulating the Digital Communication concepts.
C214.4	Able to Study and analyze the generation of Line Codes
C214.5	Able to Analyze various modulated schemes by using spectrum analyzer

SEM IV	Subject Name: IC Applications Lab (C215)
C215.1	Able to design the applications of OPAMP using IC 741
C215.2	Able to design the applications of TIMERS using IC 555
C215.3	Able to design the voltage regulators using IC 723
C215.4	Able to design IC565 PLL Applications
C215.5	Able to Analyze the three terminal regulators

SEM IV	Subject Name: Electronic Circuit Analysis Lab (C216)
C216.1	Able to design different amplifiers using Hardware
C216.2	Able to design different feedback amplifier using Hardware
C216.3	Able to design oscillators using Hardware
C216.4	Able to design different amplifiers using Multisim Software
C216.5	Able to design oscillators using Multisim Software

SEM V	Subject Name: Microprocessors & Microcontrollers (C301)
C301.1	Able to understand the internal architecture, organization and assembly language programming of 8086 processors
C301.2	Able to understand the internal architecture, organization and assembly language programming of 8051/controllers
C301.3	Able to understand the interfacing techniques to 8086 and 8051 based systems
C301.4	Able to understand the internal architecture of ARM processors.
C301.5	Able to understand Architecture of advanced ARM processors.

SEM V	Subject Name: Data Communications and Networks (C302)
C302.1	Able to know the Categories and functions of various Data communication Networks
C302.2	Able to design and analyze various error detection techniques
C302.3	Able to demonstrate the mechanism of routing the data in network layer
C302.4	Able to know the significance of various Flow control and Congestion control Mechanisms
C302.5	Able to Know the Functioning of various Application layer Protocols

SEM V	Subject Name: Control Systems (C303)
C303.1	Able to understand the modeling of linear-time-invariant systems using transfer function
C303.2	Able to understand the concept of stability and its assessment for linear-time invariant systems
C303.3	Able to understand the relationship between time and frequency responses.
C303.4	Able to design simple controllers

C303.5	Able to understand the concepts of state variables

SEM V	Subject Name: Business Economics & Financial Analysis (C304)
C304.1	Able to understand the structure of business and significance of economics
C304.2	Able to analyze demand and supply concepts.
C304.3	Able to learn the concepts of cost analysis and pricing.
C304.4	Able to understand the firm's financial position by analyzing the Financial Statements of a Company.
C304.5	Able to analyze financial accounting by ratios.

SEM V	Subject Name: Computer Organization & Operating Systems (C305)
C305.1	Able to basic structure of a digital computer, Arithmetic operations of binary number system
C305.2	Able to the organization of the Control Unit, Arithmetic and Logical Unit, Memory Unit and the I/O unit
C305.3	Able to understand the input and output organization.
C305.4	Able to Operating system functions, types, system calls, Memory management techniques and dead lock avoidance
C305.5	Able to Operating system file system and implementation and its interface.

SEM V	Subject Name: Microprocessors & Microcontrollers Lab (C306)
C306.1	Able to assembly level programming using 8086 microprocessors.
C306.2	Able to develop the assembly level programming using 8051 controller.
C306.3	Able to Analyze abstract problems and apply a combination of hardware and software to address the problem.
C306.4	Able to Contrast how different I/O devices can be interfaced to processor and will explore several techniques of interfacing.
C306.5	Able to Experiment with standard microprocessor interfaces including GPIO, serial ports, digital-to-analog converters and analog-to-digital.

SEM V	Subject Name: Data Communications and Networks Lab (C307)
C307.1	Able to study the different network tools to understand the network performance
C307.2	Able to analyze performance of various communication protocols.
C307.3	Able to understand details and functionality of layered network architecture.

C307.4	Able to analyze the performance of Data communication and networking.
C307.5	Able to analyze performance of computer network.

SEM V	Subject Name: Advanced Communication Skills Lab (C308)
C308.1	Able to Acquire vocabulary and use it contextually.
C308.2	Able to Listen and speak effectively
C308.3	Able to Develop proficiency in academic reading and writing.
C308.4	Able to Increase possibilities of job prospects.
C308.5	Able to Communicate confidently in formal and informal Contexts

SEM VI	Subject Name: Antennas and Propagation (C309)
C309.1	Able to Characterize the antennas based on frequency, configure the geometry and establish the radiation patterns of VHF, UHF and Microwave antennas and also antenna arrays
C309.2	Able to Specify the requirements for microwave measurements and arrange a setup to carry out the antenna far zone pattern and gain measurements in the laboratory
C309.3	Able to understand Antenna Array requirements and determine the characteristics of various antennas.
C309.4	Able to understand the design relations of VHF, UHF and microwave antennas.
C309.5	Able to Classify the different wave propagation mechanisms, determine the characteristic features of different wave propagations

SEM VI	Subject Name: Digital Signal Processing (C310)
C310.1	Able to Understand the LTI system characteristics and Multirate signal processing
C310.2	Able to Understand the inter-relationship between DFT and various transforms
C310.3	Able to Design a IIR digital filter for a given specification
C310.4	Able to Design a FIR digital filter for a given specification
C310.5	Able to Understand the significance of various filter structures and effects of round off errors

SEM VI	Subject Name: VLSI Design (C311)
C311.1	Able to Acquire qualitative knowledge about the fabrication process of integrated circuits using MOS transistors.

C311.2	Able to Draw the layout of any logic circuit which helps to understand and estimate parasitic effect of any logic circuit.
C311.3	Able to Design the gate level circuits, calculation of fan-in and fan-out.
C311.4	Able to Design building blocks of data path systems, memories.
C311.5	Able to Design building blocks simple logic circuits using PLA, PAL, FPGA and CPLD Understand different types of faults that can occur in a system and learn the concept of testing and adding extra hardware to improve testability of system.

SEM VI	Subject Name: Embedded System Design (C312)
C312.1	Able to understand the selection procedure of Processors in the embedded domain.
C312.2	Able to understand the typical embedded system.
C312.3	Able to Design Procedure for Embedded Firmware.
C312.4	Able to visualize the role of Real time Operating Systems in Embedded Systems.
C312.5	Able to evaluate the Correlation between task synchronization and latency issues

SEM VI	Subject Name: Basics of Sensors Technology (C313)
C313.1	Able to Identify suitable Sensors and transducers for real time applications.
C313.2	Able to Identify suitable Active Sensors and Active transducers for real time applications.
C313.3	Able to Translate theoretical concepts into working models.
C313.4	Able to Design the experimental applications to engineering modules and practices.
C313.5	Able to Design engineering solution to the Industry/Society needs and develop products

SEM VI	Subject Name: Digital signal processing lab(C314)
C314.1	Able to generate discrete time signals/ waveforms.
C314.2	Able to understand the importance of frequency domain by evaluating DFT, FFT, power Spectrum.
C314.3	Able to Implement IIR and FIR digital filters.
C314.4	Able to understand the importance of multi-rate signal processing.
C314.5	Able to plot frequency response and impulse response of first order and second order systems. Able to do noise removal.

SEM VI	Subject Name: e – CAD Lab (C315)

C315.1	Able to Design Entry & simulation of Multiplexer circuit with test bench & functional verification
C315.2	Able to Design Entry & simulation of D flip-flop circuit with test bench & functional.
C315.3	Able to Synthesis, P&R and Post P&R simulation for Full adder, Concepts of FPGA floor plan, critical path, design gate count, I/O configuration and pin assignments.
C315.4	Able to Generation of configuration/fuse files for 4:1 multiplexer & D flip-flop & implementation of the hardware using FPGA
C315.5	Able to Design a schematic and simple layout for CMOS Inverter, parasitic extract.

SEM VI	Subject Name: Scripting Languages Lab (C316)
C316.1	Able to Gain knowledge of the strengths and weakness of Ruby and select an appropriate language for solving a given problem.
C316.2	Able to write Ruby script for different applications
C316.3	Able to Gain knowledge of the strengths and weakness of TCL and select an appropriate language for solving a given problem.
C316.4	Able to write TCL script for different applications
C316.5	Able to Gain knowledge of the strengths and weakness of PERL and select an appropriate language for solving a given problem.

SEM VII	Subject Name: Microwave and Optical Communications (C401)
C401.1	Able to Know power generation at microwave frequencies and derive the performance characteristics.
C401.2	Able to realize the need for solid state microwave sources and understand the principles of solid state devices.
C401.3	Able to distinguish between the different types of waveguide and ferrite components, and select proper components for engineering applications
C401.4	Able to understand the utility of S-parameters in microwave component design and learn the measurement procedure of various microwave parameters.
C401.5	Able to Understand the mechanism of light propagation through Optical Fibers.

SEM VII	Subject Name: Digital Image Processing (C402)
C402.1	Able to Explore the fundamental relations between pixels and utility of 2-D transforms in image processer.
C402.2	Able to Understand the enhancement and segmentation process on an image.
C402.3	Able to Understand the restoration processes on an image.
C402.4	Able to Implement the various Morphological operations on an image
C402.5	Able to Understand the need of compression and evaluation of basic compression algorithms

SEM VII	Subject Name: Database Management Systems (C403)
C403.1	Able to Gain knowledge of fundamentals of DBMS.
C403.2	Able to design database and normal forms
C403.3	Able to Master the basics of SQL for retrieval and management of data
C403.4	Able to be acquainted with the basics of transaction processing and concurrency control
C403.5	Able to Familiarity with database storage structures and access techniques

SEM VII	Subject Name: Remote Sensing & GIS (C404)
C404.1	Able to Describe different concepts and terms used in Remote Sensing and its data.
C404.2	Able to Know the history of GIS and maps related.
C404.3	Able to Understand the Data conversion and Process in different coordinate systems of GIS interface
C404.4	Able to Evaluate the accuracy of Data and implementing a GIS
C404.5	Able to Understand the applicability of RS and GIS for various application

SEM VII	Subject Name: Professional Practice, Law & Ethics (C405)
C405.1	Able to understand importance of professional practice, law and ethics in their personal lives and professional careers.
C405.2	Able to learn the rights and responsibilities as an employee, team member and global citizen.
C405.3	Able to Acquiring knowledge of various roles of Engineer In applying ethical principles at various professional levels
C405.4	Able to Excelling in competitive and challenging environment to contribute to industrial growth.
C405.5	Able would learn various provisions related to Intellectual Property Rights. Concepts, Objectives & Rules relating to Patents Act, 1970, Copyright Act, 1957 & Trade Marks Act, 1999. Applicability, Duration, Registrations Procedures

SEM VII	Subject Name: Microwave and Optical Communications Lab (C406)
C406.1	Able to plot the characteristics of reflex klystron oscillator and gunn Oscillator
C406.2	Able to plot the characteristics of direction coupler and scattering parameters of waveguides
C406.3	Able to evaluate the frequency, impedance and VSWR of given microwave signal
C406.4	Able to understand the characteristics of LASER and LED
C406.5	Able to Measure the numerical aperture , data rate and losses in optical fiber communications

SEM VII	Subject Name: Industrial Oriented Mini Project/ Summer Internship (C407)
C407.1	Able to practice acquired knowledge within the chosen area of technology for project development.
C407.2	Able to Identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach.
C407.3	Able to Reproduce, improve and refine technical aspects for engineering projects.
C407.4	Able to Work as an individual or in a team in development of technical projects.
C407.5	Able to Communicate and report effectively project related activities and findings

SEM VII	Subject Name: Seminar (C408)
C408.1	Establish motivation for any topic of interest and develop a thought process for technical presentation.
C408.2	Organize a detailed literature survey and build a document with respect to technical publications.
C408.3	Analysis and comprehension of proof-of-concept and related data. Establish motivation for any topic of interest and develop a thought process for technical presentation.
C408.4	Effective presentation and improve soft skills.
C408.5	Make use of new and recent technology (e.g. overleaf) for creating technical reports

SEM VII	Subject Name: Project Stage - I (C409)
C409.1	Identify the problem statement through literature survey for project work.
C409.2	Arrive at conceptual project design through brainstorming
C409.3	Develop design strategy for the project work.
C409.4	Apply appropriate modern tools to execute the project work.
C409.5	Evaluate application of project work with appropriate societal consideration.

SEM VIII	Subject Name: Wireless Sensor Networks (C410)
C410.1	Able to Analyze and compare various architectures of Wireless Sensor Networks
C410.2	Able to Understand Design issues and challenges in wireless sensor networks
C410.3	Able to understand the MAC protocols
C410.4	Able to Analyze and compare various data gathering and data dissemination methods.

C410.5	Able to Design, Simulate and Compare the performance of various routing and MAC protocol

SEM VIII	Subject Name: System on Chip Architecture (C411)
C411.1	Able to understand SOC Architectural features.
C411.2	Able to acquire the knowledge on processor selection criteria and limitations
C411.3	Able to acquire the knowledge of memory architectures on SOC.
C411.4	Able to understand the interconnection strategies on SOC
C411.5	Able to understand the customization on SOC.

SEM VIII	Subject Name: Machine Learning (C412)
C412.1	Able to Understand the concepts of computational intelligence like machine learning
C412.2	Able to Understand the artificial neural networks and evaluation hypotheses
C412.3	Able to Understand the Neural Networks and its usage in machine learning applications
C412.4	Able to Understand the genetic algorithms.
C412.5	Ability to get the skill to apply machine learning techniques to address the real time problems in different areas

SEM VIII	Subject Name: Project Stage - II (C413)
C413.1	Understand the process to make reports and presentations.
C413.2	Apply engineering knowledge to solve various industrial problems
C413.3	Analyze ethical practices and tools used for different technologies.
C413.4	Justify the performance on designing parameters and other technical aspects.
C413.5	Design and develop the skills to make software/hardware, related to project for serving the society.