

Course outcome statements

SE SEM 3 Signal & Systems	Students will be able to
C201.1	Classify continuous and discrete time signals and systems. Describe sampling of analog signals, elementary signals used for testing and operations on signals.
C201.2	Develop input-output relationship for linear time invariant system and compute convolution for continuous and discrete time systems. Compute step response in terms of impulse response and analyze system properties in terms of impulse response.
C201.3	Describe and express the continuous and discrete periodic signals in frequency domain using Fourier series and sketch discrete time spectrum.
C201.4	Describe and express the continuous and discrete time signals in frequency domain using Fourier transforms and sketch their continuous time spectrum.
C201.5	Recognize the limitations of Fourier transform and need for Laplace transform to analyze continuous time system in s-domain.
C201.6	Outline the basic concept of probability, random variables & random signals and develop the ability to find correlation, CDF, PDF and probability of a given event.
SE SEM 3 Electronic Devices And Circuits	Students will be able to
C202.1	Interpret basic parameters of JFET & analyze, model FET for small signal
C202.2	Interpret, apply & evaluate DC parameter of MOSFET.
C202.3	Interpret, apply & evaluate AC parameter of MOSFET & its behavior.
C202.4	Explain various MOSFET applications.
C202.5	Apply concept of feedback to improve stability of amplifier circuits.
C202.6	Design a variable voltage regulator circuits.
SE SEM 3 Electrical Circuits and Machines	Students will be able to
C203.1	Analyze basic AC & DC circuit for voltage, current and power by using KVL, KCL, and network theorems.
C203.2	Explain the working principle of different electrical machines.
C203.3	Select proper electrical motor for given application.

C203.4	Design and analyze transformers.
SE SEM 3 Data Structures and Algorithms	Students will be able to
C204.1	Choose the data structures that effectively model the information in a problem
C204.2	Judge efficiency trade-offs among alternative data structure implementations or combinations.
C204.3	Apply algorithm analysis techniques to evaluate the performance of an algorithm and to compare data structure
C204.4	Implement and know when to apply standard algorithm for searching and sorting
C204.5	Design , implement , test and debug programs using a variety of data structures including lists , stacks, queues , hash tables.
C204.6	Implement logic for constructing binary tree structures, search trees, graphs and performing primitive operations.
SE SEM 3 Digital Electronics	Students will be able to
C205.1	Simplify and optimize digital circuit using different reduction techniques.
C205.2	Design and implementation of sequential circuits.
C205.3	Identify and design state machines using mealy and Moore models.
C205.4	Compare, design, implement and explain combinational and sequential circuit of different logic families.
C205.5	Differentiate and implement semiconductor memories such as PLD, CPLD, FPGA etc.
C205.6	Discuss the architecture and use of microcontrollers for basic operations and Simulate using simulation software.
SE SEM 3 Electronic Measuring Instruments and	Students will be able to

Tools	
C206.1	Measure and check the various electrical parameters and electronic components.
C206.2	Aware and identify the control panels of measuring and generating modern instruments.
C206.3	Describe specifications, features and capabilities of electronic instruments and select appropriate instrument for the measurement.
C206.4	Select appropriate instrument for the measurement of electrical parameter professionally.
C206.5	Finalize the specifications of instrument and select an appropriate instrument for given measurement.
C206.6	Make the required measurement using various instruments.
TE SEM 5 Digital Communication	Students will be able to
C301.1	Explain and Simulate the performance of a digital communication system.
C301.2	Describe working of waveform coding techniques and analyse their performance.
C301.3	Describe & statistically analyse random processes & noise
C301.4	Design of baseband receiver for detection of a signal in AWGN channel.
C301.5	Analyze and Simulate the performance pass band digital communication system and determine probability of error.
C301.6	Analyze Performance of spread spectrum communication system.
TE SEM 5 Digital Signal Processing	Students will be able to
C302.1	Describe and apply digital signal processing fundamentals and sampling theorem for A to D conversion of a signal with adequate sampling rates and analyze the aliasing process.
C302.2	Represent DT signals in the frequency domain using DTFT, DFT, FFT and Z transform and state their applications.
C302.3	Represent discrete time signals in the frequency domain using Z transform and analyze the system's stability.
C302.4	Identify, describe and design IIR filters.
C302.5	Identify, describe and design FIR filters.

C302.6	Develop different signal processing applications using DSP processor.
TE SEM 5 Electromagnetics	
C303.1	Students will be able to Explain and apply the fundamental laws i.e. Gauss's and Coulomb's law of electrostatic fields to point, line and surface charge distribution with the use of respective coordinate system equations and vector field theorems; interpret and solve problems on Gradient, Curl, Divergence in cartesian, cylindrical, spherical coordinate systems and Electric field intensity due to various charge distributions.
C303.2	Define electrical properties of materials like polarization, strength, discriminate between conductors and dielectrics on the basis of conduction current and convention current; interpret and solve problems on capacitance, energy density, boundary conditions and overcome boundary value problems by using Poisson's and Laplace equations.
C303.3	Relate the laws of electrostatics with the laws of magnetostatics with interpretation of Maxwell's equations in differential and integral form, solve problems on boundary conditions, applications of Biot-Savart's and Ampere's circuital law.
C303.4	Explain, interpret and solve problems on Faraday's law, displacement current, time varying Maxwell's equations in differential and integral form, Poynting theorem and explain the concept of retarded magnetic vector potential.
C303.5	Describe the concept of transmission line, its types and parameters and solve problems related to different parameters; interpret and solve problems by use of Smith Chart.
C303.6	Describe electromagnetic wave (uniform plane wave), the reflection and normal incidence of a uniform plane wave, derive and interpret Helmholtz equation (wave equation) and solve problems.
TE SEM 5 Mechatronics	
C305.1	Students will be able to Identify key elements of mechatronics systems required for various applications
C305.2	Compare and select sensors or transducers as per requirement of application area
C305.3	Make use of sensors for position, velocity and liquid flow measurements
C305.4	Differentiate and select hydraulic, pneumatic and electrical actuators
C305.5	Elaborate upon case study of mechatronics system design.
C305.6	Prepare report and/or power point presentation on industrial visit.
TE SEM 5 Electronics system	
C305.6	Students will be able to

Design	
C306.1	Design , Analyze the working of electronics devices for specified electronic design system based on selection of components and device
C306.2	Design prototype of data acquisition system using transducer and signal conditioning circuit.
C306.3	Analyze and test performance of various Design of electronics system by simulation software.
C306.4	Develop the Design skills and ability to create, manage query using modern design tools.
C306.5	Design PCB taking into consideration the various design issues.
BE SEM 7 VLSI Design & Technology	Students will be able to
C401.1	Design various Digital systems having set of objectives and design constraints using VHDL programming.
C401.2	Implement VLSI Design Flow using PLDs.
C401.3	Analyze different factors to be considered for floor planning, placement and routing.
C401.4	Apply CMOS technology specific layout rules and to design CMOS based digital circuits.
C401.5	Analyze various issues and constraints in design of an ASIC.
C401.6	Apply knowledge of testability in design and build self test circuit.
BE SEM 7 Computer Networks & Security	Students will be able to
C402.1	Apply fundamental underlying principles of computer networking .
C402.2	Describe hardware, software, components of a network and the interrelations.
C402.3	Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies .
C402.4	Apply a basic knowledge of installing and configuring networking applications .
C402.5	Specify and identify deficiencies in existing protocols, and then go onto select new and better protocols .
C402.6	Apply a basic knowledge of the use of cryptography and network security .
BE SEM 7 Radiation and Microwave Techniques	Students will be able to

C 403.1	Differentiate various performance parameters of radiating elements.
C 403.2	Analyze and design various radiating elements and arrays.
C403.3	Apply the knowledge of waveguide fundamentals in design of transmission lines.
C 403.4	Design a system consisting of various passive microwave components.
C 403.5	Analyze tube based and solid state active devices along with their applications
C403.6	Choose a suitable microwave measurement instruments and carry out the required measurements.
BE SEM 7 Digital Image and Video Processing	
	Students will be able to
C404-A.1	Students will be able to Analyze and apply fundamental concepts of Digital Image Processing.
C404-A.2	Students will be able to analyze and solve image enhancement and image restoration techniques.
C404-A.3	Students will be able to Design and implement image compression using Matlab platform.
C404-A.4	Students will be able to segment objects and region of the image with appropriate method.
C404-A.5	Students will be able to represent objects with appropriate description method.
C404-A.6	Students will be able to analyze video signal representation and different algorithms of video processing.
BE SEM 7 Embedded Systems & RTOS	
	Students will be able to
C404-C.1	Explain and relate design metrics, Development tool and Standard programming practices of Embedded systems to design real time applications to match recent trends in technology.
C404-C.2	Explain and describe Real time systems concepts.
C404-C.3	Explain Features and services of μ COS II.
C404-C.4	Use modern architecture for embedded system.
C404-C.5	Explain Linux operating system and Embedded Linux Development Environment.
C404-C.6	Use open platform for embedded system development

BE SEM 7 Electronics product Design	Students will be able to
C405-B.1	Describe the concept & examine the various stages of Electronic product design.
C405-B.2	Examine the various stages of hardware design & testing methods.
C405-B.3	Compare various software development models and infer good programming practices.
C405-B.4	Design PCB taking into consideration the various design issues.
C405-B.5	Discuss importance of Product Debugging & testing methods.
C405-B.6	Explain the need, types, methods and layout of documentation.
BE SEM 7 ELECTRONICS IN AGRICULTURE	Students will be able to
405-E.1	Understand Role of computers & virtual instrumentation.
405-E.2	Provide communication solution for interpreting environmental parameters with Electronics systems.
405-E.3	Describe Instrument technology used in agriculture
405-E.4	Apply knowledge of Electronics in Agriculture.
405-E.5	Understand Greenhouse Technology & Role of Electronics Governance
BE SEM 7 Project Phase-I	Students will be able to
C406.1	Apply the knowledge of mathematics, science and engineering fundamentals to the solution of complex engineering problems.
C406.2	Implement practically, ideas/real time industrial problems/ current application of respective/multidisciplinary engineering branches.
C406.3	Apply project management skill to design system/product by taking into consideration different issues such as safety, ethics, social, health, legal, cultural and cost standards.
C406.4	Use different modern tools and equipments like LabView, Xilinx, MATLAB, multisim, Keil, NS-II, spectrum Analyzer, Logic analyzer, MSO, Vector Network analyzer etc.
C406.5	Participate in national/international paper presentation/publication/project competition activities.
C406.6	Prepare project Report (proposals) and present their project work in English.

SE SEM 4 Integrated Circuits	Students will be able to
C208.1	Infer the characteristics of IC and Op-Amp and identify the internal structure.
C208.2	Explain and identify various manufacturing techniques
C208.3	Evaluate various performances based parameters and their significance for Op-Amp.
C208.4	Analyze and identify linear and nonlinear applications of Op-Amp.
C208.5	Explain and apply the functionalities of PLL to Frequency synthesizer, multiplier, FM, and AM demodulators
C208.6	Verify results (levels of V & I) with hardware implementation.
SE SEM 4 Control Systems	Students will be able to
CO209.1	Draw a physical Model and express input-output relationships by means of block diagrams, mathematical model and transfer functions.
CO209.2	Explain the relationships between the parameters of a control system and its stability, accuracy, transient behavior.
CO209.3	Find the parameter ranges for a desired degree of stability and Study the classical stability tests, such as the Routh-Hurwitz, Nyquist criterions and design methods using root-locus plots, Bode plots.
CO209.4	Model and analyze the control systems using state space analysis.
CO209.5	Design a P, PD, PI, or PID controller based on the transient and steady state response criteria.
SE SEM 4 Analog Communication	Students will be able to
C210.1	Explain the concept of amplitude modulation and explain various modulation techniques.
C210.2	Explain various types of AM radio receivers
C210.3	Explain the concept of frequency modulation and explain various modulation techniques.
C210.4	Explain various types of FM radio receivers.
C210.5	Define different types of noise and performance of analog communication systems in presence of noise
C210.6	Describe various pulse analog modulation techniques and PCM.
SE SEM 4 Object Oriented	Students will be able to

Programming	
C211.1	Describe and explain the principles of object oriented programming.
C211.2	Apply the concepts of data encapsulation, inheritance in C++.
C211.3	Describe and explain basic program constructs in Java
C211.4	Apply the concepts of classes, methods and object to write programs Java.
C211.5	Describe and apply the concepts of Inheritance, Packages and Interfaces to write programs in Java.
C211.6	Describe and apply the concepts of Multithreading, Exception handling & Applets In java.
SE SEM 4 Employability Skills Development	Students will be able to
C212.1	Be equipped with essential verbal and non-verbal communication skills
C212.2	Have skills and preparedness for analytical reasoning and quantitative ability tests.
C212.3	Have skills and preparedness for aptitude tests.
C212.4	Be equipped with essential communication skills viz. grammar, comprehension, etc.
C212.5	Master the presentation skill and be ready for facing interviews.
C212.6	Build team and lead it for problem solving.
TE SEM 6 Power Electronics	Students will be able to
C307.1	Derive, Analyze and Design Different Triggering and gate drive Circuits for Thyristor.
C307.2	Derive, Analyze, Design and Test Power converters.
C307.3	Analyze and test performance of motor drives, various power electronics applications like UPS, SMPS etc. and some protection circuits.
C307.4	Develop the skills in both verbal and written form.
TE SEM 6 Information theory, coding techniques & computer network	Students will be able to
C308.1	Perform information theoretic analysis of communication system.
C308.2	Design a data compression scheme using suitable source coding technique.
C308.3	Design a channel coding scheme for a communication system.

C308.4	Apply fundamental principles of data communication and networking.
C308.5	Apply flow and error control techniques in communication networks.
C308.6	Discuss and differentiate various communication protocols.
TE SEM 6 Business Management	Students will be able to
C309.1	Use the Management Science aspects beneficial in business
C309.2	Interpret, analyze and find out the quality Aspects for Systematically Running the Business.
C309.3	Examine & interpret the basic terminology of finance and project management.
C309.4	Identify, describe & analyze the usage of the human resource processes in industrial management.
C309.5	Demonstrate entrepreneurship skills & motivate themselves for entrepreneurship.
C309.6	Explain and interpret the need of marketing, supply chain management and customer relationship management
TE SEM 6 Advanced Processors	Students will be able to
C310.1	Express the need and application of ARM Microprocessors in embedded system
C310.2	Describe the ARM7 microprocessor architectures and its feature.
C310.3	Design embedded system with available resources.
C310.4	Interface the advanced peripherals to ARM7 based microcontroller
C310.5	Explain architecture and features of typical DSP Processor
C310.6	Use of DSP Processors and resources for signal processing applications
TE SEM 6 System Programming & Operating System	Students will be able to
C 311.1	Explain fundamental language processing activities to design and

	implement assemblers, macro processor using Linux platform.
C 311.2	Describe significance of compilers, Linkers and Loaders.
C 311.3	Discuss different types of operating systems along with concept of process management, system calls and CPU scheduling algorithms implement on Linux platform.
C 311.4	Compare the concurrency and synchronization methods used in operating systems, categorize the conditions that cause deadlock and assess its prevention and avoidance algorithm
C 311.5	Explain memory management techniques and implement various page replacement algorithms in operating system on Linux platform.
C 311.6	Describe device management, Input-Output management and file system structure by case study of Linux OS.
TE SEM 6 Employability Skills & Mini Project	Students will be able to
C312.1	Implement electronic hardware by learning PCB artwork design,
C312.2	Apply soldering techniques, testing and troubleshooting of respective circuits practically.
C312.3	Develop design using specifications from datasheet
C312.4	Prepare a technical report and deliver seminar based on the Mini Project
BE SEM 8 Mobile Communication	Students will be able to
C407.1	Apply the concept of switching to design multistage network
C407.2	Design networks using concepts of traffic engineering and signalling techniques.
C407.3	Explain cellular concepts and its propagation mechanism.
C407.4	Explore the architecture of GSM.
C407.5	Explain GSM channels and GSM transmission concepts.
C407.6	Differentiate and explain concept of 4G LTE and 5G technologies.
BE SEM 8 Broadband Communication system	Students will be able to
C408.1	Explain the Key Elements of Optical Fiber Systems.
C408.2	Design Link power budget and Rise Time Budget by selecting proper system components.
C408.3	Identify and analyze WDM components for advanced light wave systems.
C408.4	Explain Orbital Mechanics and Launchers.
C408.5	Describe satellite subsystems.

C408.6	Design Satellite Up Link and Down Links system.
BE SEM 8 PLC & Automation	Students will be able to
C409-B.1	Explain the process-control loop, difference between analog and digital process control systems.
C409-B.2	Differentiate various transmitters & Design an analog /digital signal-conditioning system .
C409-B.3	Explain the basic principles & characteristics of Mechanical switches, Solid state switches, Electrical actuators & motors.
C409-B.4	Design ladder diagrams and understand PLC architecture, PLC addressing concepts, IT Interfaces required, Supporting Applications interfaces.
C409-B.5	Differentiate between basic Elements and specifications of SCADA & DCS system.
C409-B.6	Understand & explain basics of NC,CNC,DNC machines, Device networks, Control networks.
BE SEM 8 Audio Video Engineering	Students will be able to
C409-C.1	Describe, interpret colour television fundamentals, fault finding & servicing equipments and discriminate between television standards.
C409-C.2	Describe digital television, MPEG standards, video compression techniques, display devices and prepare detailed report on visit to recording studio/broadcasting station.
C409-C.3	Explain HDTV standards, digital TV satellite systems with preparation of case studies on digital broadcasting.
C409-C.4	Explain IPTV systems, Mobile TV, Video projectors and intercom systems.
C409-C.5	Simulate audio, video and image compression techniques and explain different audio and video recording techniques.
C409-C.6	Explain studio acoustics, acoustics chambers, prepare summary of different types of speakers and microphones.
BE SEM 8 Wireless sensor Network	Students will be able to

C410-C.1	Explain various concepts and terminologies used in WSN
C410-C.2	Describe importance and use of radio communication and link management in WSN
C410-C.3	Explain various wireless standards and protocols associated with WSN
C410-C.4	Recognize importance of localization and routing techniques used in WSN
C410-C.5	Understand techniques of data aggregation and importance of security in WSN
C410-C.6	Examine the issues involved in design and deployment of WSN
BE SEM 8 Renewable Energy Systems	
	Students will be able to
C410-D.1	Interpret energy reserves of India and potential of different energy sources
C410-D.2	Measure the solar radiation parameters and performance of different solar collectors.
C410-D.3	Calculate different parameters of wind turbine rotor
C410-D.4	Implicit the importance and applications of geothermal and ocean energy.
C410-D.5	Demonstrate knowledge in field of fuel cell and potential for power generation.
BE SEM 8 Project Phase-II	
	Students will be able to
C411.1	Apply the knowledge of mathematics, science and engineering fundamentals to the solution of complex engineering problems.
C411.2	Implement practically, ideas/real time industrial problems/ current application of respective/multidisciplinary engineering branches.
C411.3	Apply project management skill to design system/product by taking into consideration different issues such as safety, ethics, social, health, legal, cultural and cost standards.
C411.4	Use different modern tools and equipments like LabView, Xilinx, MATLAB, multisim, Keil, NS-II, spectrum Analyzer, Logic analyzer, MSO, Vector Network analyzer etc.

C411.5	Participate in national/international paper presentation/publication/project competition activities.
C411.6	Prepare project Report (proposals) and present their project work in English.