BHARATI VIDYAPEETH'S
COLLEGE OF ENGINEERING FOR WOMEN, PUNE

SE 2021-2022 (Syllabus of 2019 Pattern)

Department of Electronics and Telecommunication Engineering

Course Outcome Statements and CO-PO-PSO Mapping	
Course	2019
Class	SE
Course Code	C201
Course Name	Engineering Mathematics III

CO No.	CO Description	BTL level	Name
C201.1	Solve higher order linear differential equation using appropriate techniques for modelling,analyzing of electrical circuits and control systems.	3	Apply
C201.2	Apply concept of Fourier transform & Z-transform and its applications to continuous & discrete systems, signal & image processing and communication systems.	3	Apply
C201.3	Obtain Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-step iterative methods used in modern scientific computing.	4	Analyze
C201.4	Perform vector differentiation & integration, analyze the vector fields and apply to electro-magnetic fields & wave theory.	4	Analyze
C201.5	Analyze Complex functions, Conformal mappings, Contour integration applicable to electrostatics, digital filters, signal and image processing..	4	Analyze
C201.6	Integrate mathematical techniques such as differential equations, transforms, numerical methods, vector calculus, and complex analysis to model, analyze, and solve engineering problems in electronics, communication, and control systems.	5 / 6	(Evaluate) (Create)

Course Outcome Statements and CO-PO-PSO Mapping	
Course	2019
Class	SE
Course Code	C202
Course Name	Engineering Mathematics III(TW)

CO No.	CO Description	BTL level	Name
C201.1	Solve higher order linear differential equation using appropriate techniques for modelling,analyzing of electrical circuits and control systems.	3	Apply
C201.2	Apply concept of Fourier transform & Z-transform and its applications to continuous & discrete systems, signal & image processing and communication systems.	3	Apply
C201.3	Obtain Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-step iterative methods used in modern scientific computing.	4	Analyze
C201.4	Perform vector differentiation & integration, analyze the vector fields and apply to electro-magnetic fields & wave theory.	4	Analyze
C201.5	Analyze Complex functions, Conformal mappings, Contour integration applicable to electrostatics, digital filters, signal and image processing..	4	Analyze
C201.6	Integrate mathematical techniques such as differential equations, transforms, numerical methods, vector calculus, and complex analysis to model, analyze, and solve engineering problems in electronics, communication, and control systems.	5 / 6	(Evaluate) (Create)

Course Outcome Statements and CO-PO-PSO Mapping	
Course	2019
Class	SE
Course Code	C203
Course Name	Electronic Circuits

CO no.	CO Description	BTL level	Name
C203.1	Assimilate the physics, characteristics and parameters of MOSFET towards its application asamplifier.	2	Understand
C203.2	Design MOSFET amplifiers, with and without feedback, & MOSFET oscillators, for givenspecifications.	6	Create
C203.3	Analyze and assess the performance of linear and switching regulators, with their variants,towards applications in regulated power supplies.	5	Evaluate
C203.4	Explain internal schematic of Op-Amp and define its performance parameters.	2	Understand
C203.5	Design, Build and test Op-amp based analog signal processing and conditioning circuits towardsvarious real time applications.	6	Create
C203.6	Understand and compare the principles of various data conversion techniques and PLL with theirapplications.	2	Understand

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Course Outcome Statements and CO-PO-PSO Mapping	
Course	2019
Class	SE
Course Code	C204
Course Name	Digital Circuits

CO no.	CO Description	BTL level	Name
C204.1	Identify and prevent various hazards and timing problems in a digital design.	3	Apply
C204.2	Use the basic logic gates and various reduction techniques of digital logic circuit.	3	Apply
C204.3	Analyze, design and implement combinational logic circuits.	6	Create
C204.4	Analyze, design and implement sequential circuits.	6	Create
C204.5	Differentiate between Mealy and Moore machines.	4	Analyze
C204.6	Analyze digital system design using PLD	4	Analyze

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Course Outcome Statements and CO-PO-PSO Mapping	
Course	2019
Class	SE
Course Code	C205
Course Name	Electrical Circuits

CO no.	CO Description	BTL level	Name
C205.1	Analyze the simple DC and AC circuit with circuit simplification techniques.	4	Analyze
C205.2	Formulate and analyze driven and source free RL and RC circuits.	4	Analyze
C205.3	Formulate & determine network parameters for given network and analyze the given network using Laplace Transform to find the network transfer function.	4	Analyze
C205.4	Explain construction, working and applications of DC Machines / Single Phase & Three Phase AC Motors.	2	Understand
C205.5	Explain construction, working and applications of special purpose motors & understand motors used in electrical vehicles.	2	Understand
C205.6	Analyze and select a suitable motor for different applications.	5	Evaluate

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Course Outcome Statements and CO-PO-PSO Mapping	
Course	2019
Class	SE
Course Code	C206
Course Name	Data structures

CO no.	CO Description	BTL level	Name
C206.1	Solve mathematical problems using C programming language.	3	Demonstrate
C206.2	Implement sorting and searching algorithms and calculate their complexity.	4	Analyze
C206.3	Develop applications of stack and queue using array.	3	Develop
C206.4	Demonstrate applicability of Linked List.	3	Demonstrate
C206.5	Demonstrate applicability of nonlinear data structures - Binary Tree with respect to its time complexity.	4	Analyze
C206.6	Apply the knowledge of graph for solving the problems of spanning tree and shortest path algorithm.	3	Apply

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Course Outcome Statements and CO-PO-PSO Mapping	
Course	2019
Class	SE
Course Code	C207
Course Name	Electronic Circuit Lab

CO no.	CO Description	BTL level	Name
C207.1	Assimilate the physics, characteristics and parameters of MOSFET towards its application asamplifier.	2	Understand
C207.2	Design MOSFET amplifiers, with and without feedback, & MOSFET oscillators, for givenspecifications.	6	Create
C207.3	Analyze and assess the performance of linear and switching regulators, with their variants,towards applications in regulated power supplies.	5	Evaluate
C207.4	Explain internal schematic of Op-Amp and define its performance parameters.	2	Understand
C207.5	Design, Build and test Op-amp based analog signal processing and conditioning circuits towardsvarious real time applications.	6	Create
C207.6	Understand and compare the principles of various data conversion techniques and PLL with theirapplications.	2	Understand

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Course Outcome Statements and CO-PO-PSO Mapping	
Course	2019
Class	SE
Course Code	C208
Course Name	Digital circuits Lab

CO no.	CO Description	BTL level	Name
C208.1	Identify and prevent various hazards and timing problems in a digital design.	3	Apply
C208.2	Use the basic logic gates and various reduction techniques of digital logic circuit.	3	Apply
C208.3	Analyze, design and implement combinational logic circuits.	6	Create
C208.4	Analyze, design and implement sequential circuits.	6	Create
C208.5	Differentiate between Mealy and Moore machines.	4	Analyze
C208.6	Analyze digital system design using PLD	4	Analyze

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Course Outcome Statements and CO-PO-PSO Mapping	
Course	2019
Class	SE
Course Code	C209
Course Name	Electrical Circuits(TW) lab

CO no.	CO Description	BTL level	Name
C209.1	Analyze the simple DC and AC circuit with circuit simplification techniques.	4	Analyze
C209.2	Formulate and analyze driven and source free RL and RC circuits.	4	Analyze
C209.3	Formulate & determine network parameters for given network and analyze the given network using Laplace Transform to find the network transfer function.	4	Analyze
C209.4	Explain construction, working and applications of DC Machines / Single Phase & Three Phase AC Motors.	2	Understand
C209.5	Explain construction, working and applications of special purpose motors & understand motors used in electrical vehicles.	2	Understand
C209.6	Analyze and select a suitable motor for different applications.	5	Evaluate

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Course Outcome Statements and CO-PO-PSO Mapping	
Course	2019
Class	SE
Course Code	C210
Course Name	Data Structures Lab

CO no.	CO Description	BTL level	Name
C210.1	Solve mathematical problems using C programming language.	3	Demonstrate
C210.2	Implement sorting and searching algorithms and calculate their complexity.	4	Analyze
C210.3	Develop applications of stack and queue using array.	3	Develop
C210.4	Demonstrate applicability of Linked List.	3	Demonstrate
C210.5	Demonstrate applicability of nonlinear data structures - Binary Tree with respect to its time complexity.	4	Analyze
C210.6	Apply the knowledge of graph for solving the problems of spanning tree and shortest path algorithm.	3	Apply

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Course Outcome Statements and CO-PO-PSO Mapping	
Course	2019
Class	SE
Course Code	C211
Course Name	Electronic Skill Development

CO no.	CO Description	BTL level	Name
C211.1	Identify and explain the function of electronic components, sensors, actuators, and basic circuit connections using breadboards and PCBs.	2	Remember, Understand
C211.2	Interface microcontrollers (Arduino) with input/output devices and develop basic applications using Arduino IDE and MicroPython.	6	Apply, Create
C211.3	Design and simulate simple electronic circuits using simulation software and validate them through practical testing using test and measurement instruments.	4	Apply, Analyze
C211.4	Demonstrate skills in fault finding, soldering (including SMD), PCB assembly, and repair of basic electronic circuits adhering to IPC standards.	5	Apply, Evaluate
C211.5	Calculate power requirements, select suitable power sources (batteries, solar), and plan power budgets for small embedded or electronic systems.	5	Analyze, Evaluate
C211.6	Work effectively in a team to integrate mechanical and electronic components (motors, sensors, relays) into a functioning prototype or project.	6	Apply, Create

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Course Outcome Statements	
Course	2019
Class	SE
Course Code	C212
Course Name	Signals & Systems

CO no.	CO Description	BTL level	Name
C212.1	Identify, classify basic signals and perform operations on signals.	2	Understand
C212.2	Identify, Classify the systems based on their properties in terms of input output relation and in terms of impulse response and will be able to determine the convolution between to signals.	3	Apply
C212.3	Analyze and resolve the signals in frequency domain using Fourier series and Fourier Transform.	4	Analyze
C212.4	Resolve the signals in complex frequency domain using Laplace Transform, and will be able to apply and analyze the LTI systems using Laplace Transforms.	4	Analyze
C212.5	Define and Describe the probability, random variables and random signals. Compute the probability of a given event, model, compute the CDF and PDF.	2	Understand
C212.6	Compute the mean, mean square, variance and standard deviation for given random variables using PDF	3	Apply

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Course Outcome Statements	
Course	2019
Class	SE
Course Code	C213
Course Name	Signals & Systems(TW)

CO no.	CO Description	BTL level	Name
C213.1	Identify, classify basic signals and perform operations on signals.	2	Understand
C213.2	Identify, Classify the systems based on their properties in terms of input output relation and in terms of impulse response and will be able to determine the convolution between to signals.	3	Apply
C213.3	Analyze and resolve the signals in frequency domain using Fourier series and Fourier Transform.	4	Analyze
C213.4	Resolve the signals in complex frequency domain using Laplace Transform, and will be able to apply and analyze the LTI systems using Laplace Transforms.	4	Analyze
C213.5	Define and Describe the probability, random variables and random signals. Compute the probability of a given event, model, compute the CDF and PDF.	2	Understand
C213.6	Compute the mean, mean square, variance and standard deviation for given random variables using PDF	3	Apply

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Course Outcome Statements	
Course	2019
Class	SE
Course Code	C214
Course Name	Control Systems

CO no.	CO Description	BTL level	Name
C214.1	Determine and use models of physical systems in forms suitable for use in the analysis and design of control systems.	3	Apply
C214.2	Determine the (absolute) stability of a closed-loop controlsystem.	4	Analyze
C214.3	Perform time domain analysis of control systems required for stability analysis.	4	Analyze
C214.4	Perform frequency domain analysis of control systems required for stability analysis.	4	Analyze
C214.5	Apply root-locus, Frequency Plots technique to analyze control systems.	3	Apply
C214.6	Express and solve system equations in state variable form.	3	Apply

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Course Outcome Statements	
Course	2019
Class	SE
Course Code	C215
Course Name	Principles of Communication Systems

CO no.	CO Description	BTL level	Name
C215.1	To compute & compare the bandwidth and transmission power requirements by analyzing time and frequency domain spectra of signal required for modulation schemes under study.	4	Analyze
C215.2	Describe and analyze the techniques of generation, transmission and reception of Amplitude Modulation Systems.	4	Analyze
C215.3	Explain generation and detection of FM systems and compare with AM systems.	2	Understand
C215.4	Exhibit the importance of Sampling Theorem and correlate with Pulse Modulation technique (PAM, PWM, and PPM).	3	Apply
C215.5	Characterize the quantization process and elaborate digital representation techniques (PCM, DPCM, DM and ADM).	2	Understand
C215.6	Illustrate waveform coding, multiplexing and synchronization techniques and articulate their importance in baseband digital transmission	2	Understand

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Course Outcome Statements	
Course	2019
Class	SE
Course Code	C216
Course Name	Object Oriented Programming

CO no.	CO Description	BTL level	Name
C216.1	Describe the principles of object oriented programming.	2	Understand
C216.2	Apply the concepts of data encapsulation, inheritance in C++.	3	Apply
C216.3	Understand Operator overloading and friend functions in C++.	2	Understand
C216.4	Apply the concepts of classes, methods inheritance and polymorphism to write programs C++.	3	Apply
C216.5	Apply Templates, Namespaces and Exception Handling concepts to write programs in C++.	3	Apply
C216.6	Describe and use of File handling in C++	2	Understand

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Course Outcome Statements	
Course	2019
Class	SE
Course Code	C217
Course Name	Signals & Control System Lab

CO no.	CO Description	BTL level	Name
C217.1	Generate and analyze standard signals (impulse, step, ramp, exponential, sinusoidal, rectangular, sinc) in the time and frequency domains using simulation tools.	4	Analyze
C217.2	Simulate and evaluate the effect of sampling and aliasing on audio and speech signals by varying sampling rates, and interpret their spectral properties.	5	Evaluate
C217.3	Implement convolution of signals and validate system properties such as linearity and time-invariance, including the verification of the commutative property.	5	Evaluate
C217.4	Compute Fourier series coefficients of periodic signals and reconstruct the signal using trigonometric or exponential Fourier series; analyze effects such as Gibb's phenomenon.	4	Analyze
C217.5	Analyze and simulate the time-domain and frequency-domain responses of control systems using standard tools for Root Locus, Bode, and Nyquist plots; interpret stability and system behavior.	5	Evaluate
C217.6	Design and implement state-space models and PID controllers, and analyze their effect on time-domain specifications (rise time, overshoot, settling time) of control systems.	4	Analyze

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Course Outcome Statements	
Course	2019
Class	SE
Course Code	C218
Course Name	Principle of Communication Systems Lab

CO no.	CO Description	BTL level	Name
C218.1	To compute & compare the bandwidth and transmission power requirements by analyzing time and frequency domain spectra of signal required for modulation schemes under study.	4	Analyze
C218.2	Describe and analyze the techniques of generation, transmission and reception of Amplitude Modulation Systems.	4	Analyze
C218.3	Explain generation and detection of FM systems and compare with AM systems.	2	Understand
C218.4	Exhibit the importance of Sampling Theorem and correlate with Pulse Modulation technique (PAM, PWM, and PPM).	2	Understand
C218.5	Characterize the quantization process and elaborate digital representation techniques (PCM, DPCM, DM and ADM).	4	Analyze
C218.6	Illustrate waveform coding, multiplexing and synchronization techniques and articulate their importance in baseband digital transmission	2	Understand

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Course Outcome Statements	
Course	2019
Class	SE
Course Code	C219
Course Name	Object Oriented Programming Lab

CO no.	CO Description	BTL level	Name
C219.1	Describe the principles of object oriented programming. CO2: CO3: CO4CO5: CO6:	2	Understand
C219.2	Apply the concepts of data encapsulation, inheritance in C++.	3	Apply
C219.3	Understand Operator overloading and friend functions in C++.	2	Understand
C219.4	Apply the concepts of classes, methods inheritance and polymorphism to write programs C++.	3	Apply
C219.5	Apply Templates, Namespaces and Exception Handling concepts to write programs in C++.	3	Apply
C219.6	Describe and use of File handling in C++	2	Understand

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Course Outcome Statements	
Course	2019
Class	SE
Course Code	C220
Course Name	Data Analytics Lab

CO no.	CO Description	BTL level	Name
C220.1	Assimilate the physics, characteristics and parameters of MOSFET towards its application asamplifier.	2	Understand
C220.2	Design MOSFET amplifiers, with and without feedback, & MOSFET oscillators, for givenspecifications.	6	Create
C220.3	Analyze and assess the performance of linear and switching regulators, with their variants, towards applications in regulated power supplies.	4	Analyze
C220.4	Explain internal schematic of Op-Amp and define its performance parameters.	2	Understand
C220.5	Design, Build and test Op-amp based analog signal processing and conditioning circuits towards various real time applications.	6	Create
C220.6	Understand and compare the principles of various data conversion techniques and PLL with their applications.	2	Understand

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Course Outcome Statements	
Course	2019
Class	SE
Course Code	C221
Course Name	Employability Skill Development

CO no.	CO Description	BTL level	Name
C221.1	Identify and explain the function of electronic components, sensors, actuators, and basic circuit connections using breadboards and PCBs.	2	Remember
C221.2	Interface microcontrollers (Arduino) with input/output devices and develop basic applications using Arduino IDE and MicroPython.	6	Create
C221.3	Design and simulate simple electronic circuits using simulation software and validate them through practical testing using test and measurement instruments.	4	Analyze
C221.4	Demonstrate skills in fault finding, soldering (including SMD), PCB assembly, and repair of basic electronic circuits adhering to IPC standards.	5	Evaluate
C221.5	Calculate power requirements, select suitable power sources (batteries, solar), and plan power budgets for small embedded or electronic systems.	5	Evaluate
C221.6	Work effectively in a team to integrate mechanical and electronic components (motors, sensors, relays) into a functioning prototype or project.	3	Apply

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Course Outcome Statements	
Course	2019
Class	SE
Course Code	C222
Course Name	Project Based Learning

CO no.	CO Description	BTL level	Name
C222.1	Identify the real-world problem (possibly of interdisciplinary nature) through a rigorous literature survey and formulate / set relevant aim and objectives.	3	Apply
C222.2	Contribute to society through proposed solution by strictly following professional ethics and safety measures	3	Apply
C222.3	Propose a suitable solution based on the fundamentals of electronics and communication engineering by possibly the integration of previously acquired knowledge.	6	Create
C222.4	Analyze the results and arrive at valid conclusion.	4	Analyze
C222.5	Use of technology in proposed work and demonstrate learning in oral and written form.	3	Apply
C222.6	Develop ability to work as an individual and as a team member.	3	Apply

TE 2022-2023 (Syllabus of 2019 Pattern)

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Course Outcome Statements	
Course	2019
Class	TE
Course Code	C301
Course Name	Digital Communication

CO no.	CO Description	BTL level	Name
C301.1	Apply the statistical theory for describing various signals in a communication system.	3	Apply
C301.2	Understand and explain various digital modulation techniques used in digital communication systems and analyze their performance in presence of AWGN noise.	4	Analyze
C301.3	Analyze various digital modulation techniques performance in the presence of AWGN noise.	4	Analyze
C301.4	Describe and analyze the digital communication system with spread spectrum modulation.	4	Analyze
C301.5	Analyze a communication system using information theoretic approach.	4	Analyze
C301.6	Use error control coding techniques to improve performance of a digital communication system	3	Apply

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Course Outcome Statements	
Course	2019
Class	TE
Course Code	C302
Course Name	Electromagnetic Field Theory

CO no.	CO Description	BTL level	Name
C302.1	Apply the basic electromagnetic principles and determine the fields (E & H) due to the given source.	3	Apply
C302.2	Apply boundary conditions to the boundaries between various media to interpret behavior of the fields on either sides.	3	Apply
C302.3	State, Identify and Apply Maxwell's equations (integral and differential forms) in both the forms (Static, time-varying or Time-harmonic field) for various sources, Calculate the time average power density using Poynting Theorem, Retarded magnetic vector potential.	3	Apply
C302.4	Formulate, Interpret and solve simple uniform plane wave (Helmholtz Equations) equations, and analyze the incident/reflected/transmitted waves at normal incidence.	4	Analyze
C302.5	Interpret and Apply the transmission line equation to transmission line problems with load impedance to determine input and output voltage/current at any point on the Transmission line, Find input/load impedance, input/load admittance, reflection coefficient, SWR, Vmax/Vmin, length of transmission line using Smith Chart.	4	Analyze
C302.6	Carry out a detailed study, interpret the relevance and applications of Electromagnetics.	2	Understand

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Course Outcome Statements	
Course	2019
Class	TE
Course Code	C303
Course Name	Electromagnetic Field Theory(TW)

CO no.	CO Description	BTL level	Name
C303.1	Apply the basic electromagnetic principles and determine the fields (E & H) due to the given source.	3	Apply
C303.2	Apply boundary conditions to the boundaries between various media to interpret behavior of the fields on either sides.	3	Apply
C303.3	State, Identify and Apply Maxwell's equations (integral and differential forms) in both the forms (Static, time-varying or Time-harmonic field) for various sources, Calculate the time average power density using Poynting Theorem, Retarded magnetic vector potential.	3	Apply
C303.4	Formulate, Interpret and solve simple uniform plane wave (Helmholtz Equations) equations, and analyze the incident/reflected/transmitted waves at normal incidence.	4	Analyze
C303.5	Interpret and Apply the transmission line equation to transmission line problems with load impedance to determine input and output voltage/current at any point on the Transmission line, Find input/load impedance, input/load admittance, reflection coefficient, SWR, Vmax/Vmin, length of transmission line using Smith Chart.	4	Analyze
C303.6	Carry out a detailed study, interpret the relevance and applications of Electromagnetics.	2	Understand

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Course Outcome Statements	
Course	2019
Class	TE
Course Code	C304
Course Name	Database Management

CO no.	CO Description	BTL level	Name
C304.1	Ability to implement the underlying concepts of a database system.	3	Apply
C304.2	Design and implement a database schema for a given problem-domain using data model.	6	Create
C304.3	Formulate, using SQL/DML/DDL commands, solutions to a wide range of query and update problems.	3	Apply
C304.4	Implement transactions, concurrency control, and be able to do Database recovery.	3	Apply
C304.5	Able to understand various Parallel Database Architectures and its applications.	2	Understand
C304.6	Able to understand various Distributed Databases and its applications	2	Understand

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Course Outcome Statements	
Course	2019
Class	TE
Course Code	C305
Course Name	Microcontrollers

CO no.	CO Description	BTL level	Name
C305.1	Understand the fundamentals of microcontroller and programming.	2	Understand
C305.2	Interface various electronic components with microcontrollers	3	Apply
C305.3	Analyze the features of PIC 18F XXXX.	4	Analyze
C305.4	Describe the programming details in peripheral support.	2	Understand
C305.5	Develop interfacing models according to applications.	6	Create
C305.6	Evaluate the serial communication details and interfaces.	5	Evaluate

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Course Outcome Statements	
Course	2019
Class	TE
Course Code	C306
Course Name	Elective – I(Digital Signal Processing)

CO no.	CO Description	BTL level	Name
C306.1	Interpret and process discrete/ digital signals and represent DSP system. CO2: CO3: CO4: CO5: CO6:	2	Understand
C306.2	Analyze the digital systems using the Z-transform techniques.	4	Analyze
C306.3	Implement efficient transform and its application to analyze DT signals.	3	Apply
C306.4	Design and implement IIR filters.	6	Create
C306.5	Design and implement FIR filters.	6	Create
C306.6	Apply DSP techniques for speech/ biomedical/ image signal processing.	3	Apply

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Course Outcome Statements	
Course	2019
Class	TE
Course Code	C307
Course Name	Digital Communication Lab

CO no.	CO Description	BTL level	Name
C307.1	Apply the statistical theory for describing various signals in a communication system.	3	Apply
C307.2	Understand and explain various digital modulation techniques used in digital communication systems and analyze their performance in presence of AWGN noise.	4	Analyze
C307.3	Analyze various digital modulation techniques performance in the presence of AWGN noise.	4	Analyze
C307.4	Describe and analyze the digital communication system with spread spectrum modulation.	4	Analyze
C307.5	Analyze a communication system using information theoretic approach.	4	Analyze
C307.6	Use error control coding techniques to improve performance of a digital communication system	3	Apply

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Course Outcome Statements	
Course	2019
Class	TE
Course Code	C308
Course Name	Database Management Lab

CO no.	CO Description	BTL level	Name
C308.1	Ability to implement the underlying concepts of a database system.	3	Apply
C308.2	Design and implement a database schema for a given problem-domain using data model.	6	Create
C308.3	Formulate, using SQL/DML/DDL commands, solutions to a wide range of query and update problems.	3	Apply
C308.4	Implement transactions, concurrency control, and be able to do Database recovery.	3	Apply
C308.5	Able to understand various Parallel Database Architectures and its applications.	2	Understand
C308.6	Able to understand various Distributed Databases and its applications	2	Understand

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Course Outcome Statements	
Course	2019
Class	TE
Course Code	C309
Course Name	Microcontroller Lab

CO no.	CO Description	BTL level	Name
C309.1	Understand the fundamentals of microcontroller and programming.	2	Understand
C309.2	Interface various electronic components with microcontrollers	3	Apply
C309.3	Analyze the features of PIC 18F XXXX.	4	Analyze
C309.4	Describe the programming details in peripheral support.	2	Understand
C309.5	Develop interfacing models according to applications.	6	Create
C309.6	Evaluate the serial communication details and interfaces.	5	Evaluate

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Course Outcome Statements	
Course	2019
Class	TE
Course Code	C310
Course Name	Elective I Lab(Digital Signal Processing)

CO no.	CO Description	BTL level	Name
C310.1	Interpret and process discrete/ digital signals and represent DSP system. CO2: CO3: CO4: CO5: CO6:	2	Understand
C310.2	Analyze the digital systems using the Z-transform techniques.	4	Analyze
C310.3	Implement efficient transform and its application to analyze DT signals.	3	Apply
C310.4	Design and implement IIR filters.	6	Create
C310.5	Design and implement FIR filters.	6	Create
C310.6	Apply DSP techniques for speech/ biomedical/ image signal processing.	3	Apply

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Course Outcome Statements	
Course	2019
Class	TE
Course Code	C311
Course Name	Skill Development

CO no.	CO Description	BTL level	Name
C311.1	Student should recognize the need to engage in independent and life-long learning in required skill sets.	5	Evaluate
C311.2	Student needs to experience the impact of industries on society by visiting different industries and understand the importance of industrial products for analog and digital circuits and systems.	2	Understand
C311.3	Student has to make use of the modern electronic and IT Engineering Tools and Technologies for solving electronic engineering problems.	3	Apply
C311.4	Student would be able to communicate effectively at different technical and administrative levels.	4	Analyze
C311.5	Student will exhibit leadership skills both as an individual and as a member in a team in multidisciplinary environment.	5	Evaluate
C311.6	Apply the fundamental principles of mathematics, science, and electronic engineering to analyze and solve basic problems in analog and digital circuits and systems.	3	Apply

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Course Outcome Statements	
Course	2019
Class	TE
Course Code	C312
Course Name	Cellular Networks

CO no.	CO Description	BTL level	Name
C312.1	Understand fundamentals of wireless communications	2	Understand
C312.2	Discuss and study OFDM and MIMO concepts.	2	Understand
C312.3	Elaborate fundamentals mobile communication.	2	Understand
C312.4	Describes aspects of wireless system planning.	2	Understand
C312.5	Understand of modern and futuristic wireless networks architecture.	2	Understand
C312.6	Summarize different issues in performance analysis.	2	Understand

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Course Outcome Statements	
Course	2019
Class	TE
Course Code	C313
Course Name	Project Management

CO no.	CO Description	BTL level	Name
C313.1	Apply the fundamental knowledge of project management for effectively handling the projects. CO2CO3: CO4: CO5CO6:	3	Apply
C313.2	Identify and select the appropriate project based on feasibility study and undertake its effective planning.	4	Analyze
C313.3	Assimilate effectively within the organizational structure of project and handle project management related issues in an efficient manner.	2	Understand
C313.4	Apply the project scheduling techniques to create a Project Schedule Plan and accordingly utilize the resources to meet the project deadline.	3	Apply
C313.5	Identify and assess the project risks and manage finances in line with Project Financial Management Process.	5	Evaluate
C313.6	Develop new products assessing their commercial viability and develop skill sets for becoming successful entrepreneurs while being fully aware of the legal issues related to Product development and Entrepreneurship.	3	Apply

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Course Outcome Statements	
Course	2019
Class	TE
Course Code	C314
Course Name	Power Devices & Circuits

CO no.	CO Description	BTL level	Name
C314.1	To differentiate based on the characteristic parameters among SCR, GTO, MOSFET & IGBT and identify suitability of the power device for certain applications and understand the significance of device ratings.	2	Understand
C314.2	To design triggering / driver circuits for various power devices.	6	Create
C314.3	To evaluate and analyze various performance parameters of the different converters and its topologies.	5	Evaluate
C314.4	To understand significance and design of various protections circuits for power devices.	2	Understand
C314.5	To evaluate the performance of uninterruptible power supplies, switch mode power supplies and battery.	5	Evaluate
C314.6	To understand case studies of power electronics in applications like electric vehicles, solar systems etc.	2	Understand

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Course Outcome Statements	
Course	2019
Class	TE
Course Code	C315
Course Name	Elective-II (Digital Image Processing)

CO no.	CO Description	BTL level	Name
C315.1	Apply knowledge of mathematics for image understanding and analysis.	3	Apply
C315.2	Implement spatial domain image operations.	3	Apply
C315.3	Design and realize various algorithms for image segmentation.	6	Create
C315.4	Design and realize various algorithms for image Compression.	6	Create
C315.5	Apply restoration to remove noise in the image.	3	Apply
C315.6	Describe the object recognition system.	2	Understand

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Course Outcome Statements	
Course	2019
Class	TE
Course Code	C316
Course Name	Elective-II (Sensors in Automation)

CO no.	CO Description	BTL level	Name
C316.1	Understand the Concepts of Sensors/Transducers, classify and evaluate static and Dynamic Characteristics of Measurement Systems.	2	Understand
C316.2	Choose the proper sensor comparing different standards and guidelines for measurements of Temperature and Humidity.	3	Apply
C316.3	Propose a suitable solution based on the fundamentals of electronics and communication engineering by possibly the integration of previously acquired knowledge. Choose the proper sensor comparing different standards and guidelines for measurements of Force, Pressure, Stress and Flow	5	Evaluate
C316.4	Choose the proper sensor comparing different standards and guidelines for measurements of Displacement, Vibration, Acceleration and Level	3	Apply
C316.5	Explore sensors to profound areas like environmental, Agricultural and bio-medical equipment and sustainability	4	Analyze
C316.6	Explore IoT based applications of Sensors and Transducers.	4	Analyze

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Course Outcome Statements	
Course	2019
Class	TE
Course Code	C317
Course Name	Cellular Networks Lab

CO no.	CO Description	BTL level	Name
C317.1	Understand fundamentals of wireless communications	2	Understand
C317.2	Discuss and study OFDM and MIMO concepts.	2	Understand
C317.3	Elaborate fundamentals mobile communication.	2	Understand
C317.4	Describes aspects of wireless system planning.	2	Understand
C317.5	Understand of modern and futuristic wireless networks architecture.	2	Understand
C317.6	Summarize different issues in performance analysis.	4	Analyze

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Course Outcome Statements	
Course	2019
Class	TE
Course Code	C318
Course Name	Power Devices & Circuits Lab

CO no.	CO Description	BTL level	Name
C318.1	To differentiate based on the characteristic parameters among SCR, GTO, MOSFET & IGBT and identify suitability of the power device for certain applications and understand the significance of device ratings.	2	Understand
C318.2	To design triggering / driver circuits for various power devices.	6	Create
C318.3	To evaluate and analyze various performance parameters of the different converters and its topologies.	5	Evaluate
C318.4	To understand significance and design of various protections circuits for power devices.	2	Understand
C318.5	To evaluate the performance of uninterruptible power supplies, switch mode power supplies and battery.	5	Evaluate
C318.6	To understand case studies of power electronics in applications like electric vehicles, solar systems etc.	2	Understand

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Course Outcome Statements	
Course	2019
Class	TE
Course Code	C319
Course Name	Elective-II Lab(Digital Image Processing)

CO no.	CO Description	BTL level	Name
C319.1	Apply knowledge of mathematics for image understanding and analysis.	3	Apply
C319.2	Implement spatial domain image operations.	3	Apply
C319.3	Design and realize various algorithms for image segmentation.	6	Create
C319.4	Design and realize various algorithms for image Compression.	6	Create
C319.5	Apply restoration to remove noise in the image.	3	Apply
C319.6	Describe the object recognition system.	2	Understand

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Course Outcome Statements	
Course	2019
Class	TE
Course Code	C320
Course Name	Elective-II Lab(Sensors in Automation)

CO no.	CO Description	BTL level	Name
C320.1	Understand the Concepts of Sensors/Transducers, classify and evaluate static and Dynamic Characteristics of Measurement Systems.	2	Understand
C320.2	Choose the proper sensor comparing different standards and guidelines for measurements of Temperature and Humidity.	3	Apply
C320.3	Propose a suitable solution based on the fundamentals of electronics and communication engineering by possibly the integration of previously acquired knowledge. Choose the proper sensor comparing different standards and guidelines for measurements of Force, Pressure, Stress and Flow	5	Evaluate
C320.4	Choose the proper sensor comparing different standards and guidelines for measurements of Displacement, Vibration, Acceleration and Level	3	Apply
C320.5	Explore sensors to profound areas like environmental, Agricultural and bio-medical equipment and sustainability	4	Analyze
C320.6	Explore IoT based applications of Sensors and Transducers.	4	Analyze

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Course Outcome Statements	
Course	2019
Class	TE
Course Code	C321
Course Name	Internship

CO no.	CO Description	BTL level	Name
C321.1	To develop professional competence through internship.	3	Apply
C321.2	To apply academic knowledge in a personal and professional environment.	3	Apply
C321.3	To build the professional network and expose students to future employees.	3	Apply
C321.4	Apply professional and societal ethics in their day to day life.	3	Apply
C321.5	To become a responsible professional having social, economic and administrative considerations.	3	Apply
C321.6	To make own career goals and personal aspirations.	3	Apply

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Course Outcome Statements	
Course	2019
Class	TE
Course Code	C322
Course Name	Mini Project

CO no.	CO Description	BTL level	Name
C322.1	Understand, plan and execute a Mini Project with team.	3	Apply
C322.2	Implement electronic hardware by learning PCB artwork design, soldering techniques, testing and troubleshooting etc.	6	Create
C322.3	Prepare a technical report based on the Mini project.	3	Apply
C322.4	Deliver technical seminar based on the Mini Project work carried out.	3	Apply
C322.5	Design and develop a functional prototype/system by integrating hardware and software components to meet specified requirements.	6	Create
C322.6	Evaluate the performance of the developed prototype/system against design specifications and propose necessary improvements.	5	Evaluate

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Course Outcome Statements	
Course	2019
Class	BE
Course Code	C401
Course Name	Radiation & Microwave Theory

CO no.	CO Description	BTL level	Name
C401.1	Apply the fundamentals of electromagnetic to derive free space propagation equation and distinguish various performance parameters of antenna.	3	Apply
C401.2	Identify various modes in the waveguide. Compare: coaxial line, rectangular waveguides & striplines and identify applications of the same.	4	Analyze
C401.3	Explore construction and working of principles passive microwave devices/components.	2	Understand
C401.4	Explore construction and working of principles active microwave devices/components.	2	Understand
C401.5	Analyze the structure, characteristics, operation, equivalent circuits and applications of various microwave solid state active devices.	4	Analyze
C401.6	Know the various microwave systems, device set ups of microwave measurement devices and Identify the effect of radiations on environmental sustainability.	2	Understand

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Course Outcome Statements	
Course	2019
Class	BE
Course Code	C402
Course Name	VLSI Design and Technology

CO no.	CO Description	BTL level	Name
C402.1	Develop effective HDL codes for digital design.	6	Create
C402.2	Apply knowledge of real time issues in digital design.	3	Apply
C402.3	Model digital circuit with HDL, simulate, synthesis and prototype in PLDs.	6	Create
C402.4	Design CMOS circuits for specified applications.	6	Create
C402.5	Analyze various issues and constraints in design of an ASIC.	4	Analyze
C402.6	Apply knowledge of testability in design and Build In Self Test (BIST) circuit.	3	Apply

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Course Outcome Statements	
Course	2019
Class	BE
Course Code	C403
Course Name	Cloud Computing

CO no.	CO Description	BTL level	Name
C403.1	Understand the basic concepts of Cloud Computing.	2	Understand
C403.2	Describe the underlying principles of different Cloud Service Models.	2	Understand
C403.3	Classify the types of Virtualization.	2	Understand
C403.4	Examine the Cloud Architecture and understand the importance of Cloud Security.	4	Analyze
C403.5	Develop applications on Cloud Platforms.	6	Create
C403.6	Evaluate distributed computing and the Internet of Things.	5	Evaluate

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Course Outcome Statements	
Course	2019
Class	BE
Course Code	C404
Course Name	Elective – 3(Modernized IoT)

CO no.	CO Description	BTL level	Name
C404.1	Comprehend and analyze concepts of sensors, actuators, IoT and IoE.	4	Analyze
C404.2	Interpret IoT Architecture Design Aspects.	4	Analyze
C404.3	Comprehend the operation of IoT protocols.	2	Understand
C404.4	Describe various IoT boards, interfacing, and programming for IoT.	2	Understand
C404.5	Illustrate the technologies, Catalysts, and precursors of IIoT using suitable use cases.	3	Apply
C404.6	Provide suitable solution for domain specific applications of IoT.	6	Create

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Course Outcome Statements	
Course	2019
Class	BE
Course Code	C405
Course Name	Elective – 4(Deep Learning)

CO no.	CO Description	BTL level	Name
C405.1	Classify machine learning algorithms and its types.	2	Understand
C405.2	Discuss the concepts of deep learning and its Frameworks.	2	Understand
C405.3	Identify the deep learning architectures with respect to the applications.	4	Analyze
C405.4	Demonstrate different architectures of Convolutional neural networks.	3	Apply
C405.5	Discuss natural language processing architectures.	2	Understand
C405.6	Make use of various case studies and deep learning applications.	3	Apply

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Course Outcome Statements	
Course	2019
Class	BE
Course Code	C406
Course Name	Lab Practice - 1 (RMT & Cloud Computing)RMT

CO no.	CO Description	BTL level	Name
C406.1	Apply the fundamentals of electromagnetic to derive free space propagation equation and distinguish various performance parameters of antenna.	3	Apply
C406.2	Identify various modes in the waveguide. Compare: coaxial line, rectangular waveguides & striplines and identify applications of the same.	4	Analyze
C406.3	Explore construction and working of principles passive microwave devices/components.	2	Understand
C406.4	Explore construction and working of principles active microwave devices/components.	2	Understand
C406.5	Analyze the structure, characteristics, operation, equivalent circuits and applications of various microwave solid state active devices.	4	Analyze
C406.6	Know the various microwave systems, device set ups of microwave measurement devices and Identify the effect of radiations on environmental sustainability.	2	Understand

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Course Outcome Statements	
Course	2019
Class	BE
Course Code	C406
Course Name	Lab Practice - 1 (RMT & Cloud Computing)RCC

CO no.	CO Description	BTL level	Name
C406.1	Understand the basic concepts of Cloud Computing.	3	Apply
C406.2	Describe the underlying principles of different Cloud Service Models.	4	Analyze
C406.3	Classify the types of Virtualization.	2	Understand
C406.4	Examine the Cloud Architecture and understand the importance of Cloud Security.	2	Understand
C406.5	Develop applications on Cloud Platforms.	4	Analyze
C406.6	Evaluate distributed computing and the Internet of Things.	2	Understand

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Course Outcome Statements	
Course	2019
Class	BE
Course Code	C407
Course Name	Lab Practice - 2 (VLSI Design & Elective -3)VLSI

CO no.	CO Description	BTL level	Name
C407.1	Develop effective HDL codes for digital design.	6	Create
C407.2	Apply knowledge of real time issues in digital design.	3	Apply
C407.3	Model digital circuit with HDL, simulate, synthesis and prototype in PLDs.	6	Create
C407.4	Design CMOS circuits for specified applications.	6	Create
C407.5	Analyze various issues and constraints in design of an ASIC.	4	Analyze
C407.6	Apply knowledge of testability in design and Build In Self Test (BIST) circuit.	6	Create

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Course Outcome Statements	
Course	2019
Class	BE
Course Code	C407
Course Name	Lab Practice - 2 (VLSI Design & Elective -3)MIOT

CO no.	CO Description	BTL level	Name
C407.1	Comprehend and analyze concepts of sensors, actuators, IoT and IoE.	6	Create
C407.2	Interpret IoT Architecture Design Aspects.	3	Apply
C407.3	Comprehend the operation of IoT protocols.	6	Create
C407.4	Describe various IoT boards, interfacing, and programming for IoT.	6	Create
C407.5	Illustrate the technologies, Catalysts, and precursors of IIoT using suitable use cases.	4	Analyze
C407.6	Provide suitable solution for domain specific applications of IoT.	6	Create

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Course Outcome Statements	
Course	2019
Class	BE
Course Code	C408
Course Name	Project Stage – I

CO no.	CO Description	BTL level	Name
C408.1	Demonstrate a sound technical knowledge in field of E&TC in the form of project.	6	Create
C408.2	Undertake real life problem identification, formulation and solution.	4	Analyze
C408.3	Design engineering solutions to complex problems utilizing a systematic approach.	6	Create
C408.4	Demonstrate the knowledge, effective communication skills and attitudes as professional engineer.	3	Apply

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Course Outcome Statements	
Course	2019
Class	BE
Course Code	C409
Course Name	Fiber Optic Communication

CO no.	CO Description	BTL level	Name
C409.1	Explain the working of components and measurement equipments in optical fiber networks.	2	Understand
C409.2	Calculate the important parameters associated with optical components used in fiber optic telecommunication systems.	3	Apply
C409.3	Compare and contrast the performance of major components in optical links.	4	Analyze
C409.4	Evaluate the performance viability of optical links using the power and rise time budget analysis.	5	Evaluate
C409.5	Design digital optical link by proper selection of components and check its viability using simulation tools.	6	Create
C409.6	Compile technical information related to state of art components, standards, simulation tools and current technological trends by accessing the online resources to update their domain knowledge.	2	Understand

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Course Outcome Statements	
Course	2019
Class	BE
Course Code	C410
Course Name	Elective – 5(Biomedical Signal Processing)

CO no.	CO Description	BTL level	Name
C410.1	Describe the origin of various biomedical signals and Interpret the meaning of various parameters associated with biomedical signals.	2	Understand
C410.2	Analyze ECG Signals with extraction of meaningful information	4	Analyze
C410.3	Explain Processing of EEG signals for Diseases of Central Nervous System	2	Understand
C410.4	Analyze EMG signals for understanding Neuromuscular Diseases	4	Analyze
C410.5	Analyze various Biomedical Signals	4	Analyze
C410.6	Process the biomedical signals to remove adaptive interference and noise	3	Apply

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Course Outcome Statements	
Course	2019
Class	BE
Course Code	C411
Course Name	Elective – 6(Digital Marketing)

CO no.	CO Description	BTL level	Name
C411.1	Design websites using free tools like Wordpress and explore it for digital marketing.	6	Create
C411.2	Apply various keywords for a website & to perform SEO.	3	Apply
C411.3	Understand the various SEM Tools and implement the Digital Marketing Tools.	2	Understand
C411.4	Illustrate the use of Facebook, Instagram and Youtube for Digital Marketing in real life.	3	Apply
C411.5	Use Linked in platform for various campaigning.	3	Apply
C411.6	Understand the importance of recent trends in digital marketing.	2	Understand

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Course Outcome Statements	
Course	2019
Class	BE
Course Code	C412
Course Name	Innovation & Entrepreneurship

CO no.	CO Description	BTL level	Name
C412.1	Understand Innovation, Entrepreneurship and characteristics of an entrepreneur.	2	Understand
C412.2	Develop a strong understanding of the Design Process and its application in variety of business settings.	4	Analyze
C412.3	Generate sustainable ideas.	6	Create
C412.4	Explore various processes required to be an entrepreneur.	3	Apply
C412.5	Understand patents and its process of filing.	2	Understand
C412.6	Choose and use appropriate social media for marketing.	3	Apply

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Course Outcome Statements	
Course	2019
Class	BE
Course Code	C413
Course Name	Digital Business Management

CO no.	CO Description	BTL level	Name
C413.1	Identify drivers of digital business. CO2: CO3:	2	Understand
C413.2	Illustrate various approaches and techniques for E-business and management.	3	Apply
C413.3	Prepare E-business plan.	6	Create
C413.4	Design a technology infrastructure plan suitable for E-business operations	3	Apply
C413.5	Develop financial projections and funding plans for E-business.	3	Apply
C413.6	Compile and present a comprehensive E-business plan.	4	Analysis

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Course Outcome Statements	
Course	2019
Class	BE
Course Code	C414
Course Name	Fiber Optic Lab

CO no.	CO Description	BTL level	Name
C414.1	Explain the working of components and measurement equipments in optical fiber networks.	2	Understand
C414.2	Calculate the important parameters associated with optical components used in fiber optic telecommunication systems.	3	Apply
C414.3	Compare and contrast the performance of major components in optical links.	4	Analyze
C414.4	Evaluate the performance viability of optical links using the power and rise time budget analysis.	5	Evaluate
C414.5	Design digital optical link by proper selection of components and check its viability using simulation tools.	6	Create
C414.6	Compile technical information related to state of art components, standards, simulation tools and current technological trends by accessing the online resources to update their domain knowledge.	2	Understand

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Course Outcome Statements	
Course	2019
Class	BE
Course Code	C415
Course Name	Lab Practice - 3 (Elective - 5)BSP

CO no.	CO Description	BTL level	Name
C415.1	Describe the origin of various biomedical signals and Interpret the meaning of various parameters associated with biomedical signals.	2	Understand
C415.2	Analyze ECG Signals with extraction of meaningful information	4	Analyze
C415.3	Explain Processing of EEG signals for Diseases of Central Nervous System	2	Understand
C415.4	Analyze EMG signals for understanding Neuromuscular Diseases	4	Analyze
C415.5	Analyze various Biomedical Signals	4	Analyze
C415.6	Process the biomedical signals to remove adaptive interference and noise	3	Apply

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Course Outcome Statements	
Course	2019
Class	BE
Course Code	C416
Course Name	Project Stage – II

CO no.	CO Description	BTL level	Name
C416.1	Demonstrate a sound technical knowledge in field of E&TC in the form of project.	6	Create
C416.2	Undertake real life problem identification, formulation and solution.	4	Analyze
C416.3	Design engineering solutions to complex problems utilizing a systematic approach.	6	Create
C416.4	Demonstrate the knowledge, effective communication skills and attitudes as professional engineer.	3	Apply