



DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

LIST OF COURSE OUTCOMES (COs) – R-22 REGULATION

(With Bloom's Taxonomy Level - BTL-1: Remember, BTL-2: Understand, BTL-3: Apply, BTL-4: Analyze, BTL-5: Evaluate, BTL-6: Create)

Course Code	I Year I Semester Courses
C111	MATRICES AND CALCULUS
C112	APPLIED PHYSICS
C113	C PROGRAMMING FOR ENGINEERS
C114	ENGINEERING WORKSHOP
C115	ENGLISH FOR SKILL ENHANCEMENT
C116	ELEMENTS OF ELECTRONICS AND COMMUNICATION ENGINEERING
C117	APPLIED PHYSICS LABORATORY
C118	C PROGRAMMING FOR ENGINEERS LABORATORY
C119	ENGLISH LANGUAGE AND COMMUNICATION SKILLS LABORATORY
C11A	ENVIRONMENTAL SCIENCE

Course Name	MATRICES AND CALCULUS (C111)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C111.1	Apply the concepts of matrices, rank, systems of linear equations, eigenvalues, and eigenvectors to solve engineering problems		BTL-3
C111.2	Analyze functions of single variables using differential calculus, Rolle's theorem, Mean Value Theorems, Taylor's theorem, and curve tracing techniques		BTL-4
C111.3	Apply partial differentiation and multivariable calculus to determine maxima, minima, Jacobians, and solve optimization problems		BTL-3
C111.4	Evaluate multiple integrals and use them to compute areas, volumes, mass, and centroids in engineering applications		BTL-5
C111.5	Analyze vector differentiation and integration concepts, including gradient, divergence, curl, line integrals, surface integrals, and integral theorems for engineering problems		BTL-4
C111.6	Develop mathematical models using matrices and calculus to solve real-world engineering and computational problems		BTL-6

Course Name	APPLIED PHYSICS (C112)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C112.1	Explain the fundamental concepts of quantum mechanics, wave mechanics, and their applications in engineering physics.		BTL-2
C112.2	Apply the principles of lasers, fiber optics, and optical communication systems to engineering applications.		BTL-3
C112.3	Analyze the properties and applications of semiconductors, magnetic materials, and dielectric materials in electronic devices.		BTL-4
C112.4	Apply the concepts of crystallography, crystal structures, and material characterization techniques for engineering materials.		BTL-3
C112.5	Evaluate the properties of nanomaterials, superconductors, and advanced		BTL-5

	materials for technological applications.	
C112.6	Design and propose physics-based solutions for engineering problems using concepts of materials science, optics, and modern technologies.	BTL-6

Course Name	C PROGRAMMING FOR ENGINEERS (C113)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C113.1	Explain the fundamentals of problem-solving, algorithms, flowcharts, and the syntax and semantics of the C programming language.		BTL-2
C113.2	Develop C programs using decision-making, looping constructs, arrays, and functions to solve computational problems.		BTL-3
C113.3	Analyze and implement programs using pointers, strings, structures, unions, and user-defined data types.		BTL-4
C113.4	Apply file handling techniques and dynamic memory allocation to develop efficient C programs.		BTL-3
C113.5	Evaluate alternative programming approaches and debugging techniques to improve program correctness, efficiency, and maintainability.		BTL-5
C113.6	Design and develop modular C programs to solve real-world engineering problems using appropriate programming constructs.		BTL-6

Course Name	ENGINEERING WORKSHOP (C114)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C114.1	Identify and demonstrate the use of basic workshop tools, materials, and safety practices involved in engineering activities		BTL-3
C114.2	Perform basic operations in carpentry, fitting, sheet metal, welding, and electrical workshops using appropriate tools and techniques		BTL-3
C114.3	Analyze different manufacturing processes and select suitable workshop methods for fabricating simple engineering components		BTL-4
C114.4	Apply basic skills in computer hardware assembly, networking components, and electronic circuit fabrication for practical applications		BTL-3
C114.5	Evaluate the quality, accuracy, and safety aspects of fabricated components and workshop practices		BTL-5
C114.6	Design and develop simple engineering models/prototypes by integrating workshop skills, materials, and modern tools		BTL-6

Course Name	ENGLISH FOR SKILL ENHANCEMENT (C115)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C115.1	Understand the fundamentals of English language, grammar, vocabulary, and communication skills required for professional contexts		BTL-2
C115.2	Apply effective reading, writing, listening, and speaking skills for academic and professional communication		BTL-3
C115.3	Analyze various forms of technical and professional communication such as reports, presentations, emails, and workplace documents		BTL-4
C115.4	Demonstrate interpersonal communication skills, teamwork abilities, and presentation techniques through group activities and discussions		BTL-3
C115.5	Evaluate communication strategies and language usage for effective professional interactions and career development		BTL-5
C115.6	Develop professional communication skills and create effective technical documents, presentations, and workplace communication materials		BTL-6

Course Name	ELEMENTS OF ELECTRONICS AND COMMUNICATION ENGINEERING (C116))	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C116.1	Understand the fundamentals of electronics and communication		BTL-2

	engineering, including passive and active electronic components.	
C116.2	Identify electronic components and determine their characteristics using standard coding methods and datasheets.	BTL-3
C116.3	Apply electrical and electronic measuring instruments such as voltmeters, ammeters, multimeters, CRO, and regulated power supplies to perform basic measurements	BTL-3
C116.4	Analyze electronic signals using CRO, function generator, and spectrum analyzer, and interpret waveform characteristics.	BTL-4
C116.5	Verify the operation of digital logic gates, identify analog and digital ICs, and observe different modulation techniques.	BTL-4
C116.6	Demonstrate the use of electronic simulation software and laboratory equipment to perform experiments and document engineering observations.	BTL-6

Course Name	APPLIED PHYSICS LABORATORY (C117)	Regulation	R22
Course Code	Course Code		BTL Level
C117.1	Demonstrate safe laboratory practices and perform experiments using basic physics laboratory equipment and measuring instruments.		BTL-3
C117.2	Conduct experiments related to optics, lasers, fiber optics, and wave phenomena and interpret experimental observations.		BTL-3
C117.3	Analyze experimental results related to semiconductor properties, Hall effect, and electronic material characteristics.		BTL-4
C117.4	Apply experimental techniques to determine the properties of magnetic materials, dielectric materials, and advanced engineering materials.		BTL-3
C117.5	Evaluate experimental data by comparing theoretical and practical results, estimating errors, and drawing valid conclusions.		BTL-5
C117.6	Design and prepare technical reports by integrating experimental analysis, interpretation, and applications of physics concepts in engineering fields.		BTL-6

Course Name	C PROGRAMMING FOR ENGINEERS LABORATORY (C118)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C118.1	Develop algorithms and flowcharts for solving computational problems and implement basic C programs using appropriate syntax and programming constructs.		BTL-3
C118.2	Implement C programs using decision-making statements, loops, arrays, strings, and functions to solve engineering problems.		BTL-3
C118.3	Analyze and debug C programs using pointers, structures, unions, and user-defined data types for efficient memory utilization.		BTL-4
C118.4	Apply file handling techniques and dynamic memory allocation concepts to develop modular and efficient C applications.		BTL-3
C118.5	Evaluate program execution, optimize algorithms, and apply testing and debugging techniques to improve software quality.		BTL-5
C118.6	Design and develop structured C programs for real-world problems using problem-solving approaches and modern programming tools.		BTL-6

Course Name	ENGLISH LANGUAGE AND COMMUNICATION SKILLS LABORATORY (C119)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C119.1	Demonstrate effective listening, speaking, reading, and writing skills through language laboratory activities and exercises		BTL-3
C119.2	Apply pronunciation, vocabulary, grammar, and language skills for		BTL-3

	effective oral and written communication	
C119.3	Analyze communication styles, presentation techniques, group discussions, and interpersonal communication strategies	BTL-4
C119.4	Demonstrate professional communication skills through role plays, interviews, presentations, and public speaking activities	BTL-3
C119.5	Evaluate communication effectiveness by practicing technical writing, resume preparation, email writing, and workplace communication	BTL-5
C119.6	Create professional presentations, reports, and communication artifacts using appropriate language skills and modern communication tools	BTL-6

Course Name	ENVIRONMENTAL SCIENCE (C11A)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C11A.1	Explain the concepts of environmental systems, natural resources, ecosystems, biodiversity, and their importance for sustainable development.		BTL-2
C11A.2	Identify various environmental issues such as pollution, climate change, waste management, and their impact on human health and ecosystems.		BTL-2
C11A.3	Apply environmental management practices and pollution control techniques for sustainable utilization of resources.		BTL-3
C11A.4	Analyze the impact of human activities on environmental quality and evaluate solutions for environmental problems.		BTL-4
C11A.5	Assess the importance of environmental legislation, ethics, and sustainable development practices in engineering applications.		BTL-5
C11A.6	Develop awareness and responsibility towards conservation of natural resources and adoption of eco-friendly technologies.		BTL-3

COURSE CODE	I YEAR II SEMESTER COURSES
C121	ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS
C122	ENGINEERING CHEMISTRY
C123	COMPUTER AIDED ENGINEERING GRAPHICS
C124	BASIC ELECTRICAL ENGINEERING
C125	ELECTRONIC DEVICES AND CIRCUITS
C126	APPLIED PYTHON PROGRAMMING LABORATORY
C127	ENGINEERING CHEMISTRY LABORATORY
C128	BASIC ELECTRICAL ENGINEERING LABORATORY
C129	ELECTRONIC DEVICES AND CIRCUITS LABORATORY

Course Name	ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS (C121)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C121.1	Solve first-order ordinary differential equations and apply appropriate techniques to model engineering problems		BTL-3
C121.2	Analyze higher-order differential equations and solve linear differential equations with constant coefficients for engineering applications		BTL-4
C121.3	Apply partial differential equation concepts and formulate mathematical models for physical and engineering systems		BTL-3
C121.4	Evaluate vector differentiation concepts such as gradient, divergence, curl, and their applications in engineering fields		BTL-5
C121.5	Analyze line, surface, and volume integrals and apply Green's, Gauss divergence, and Stokes' theorems to solve problems		BTL-4
C121.6	Develop mathematical solutions for real-world engineering and computational problems using differential equations and vector calculus concepts		BTL-6

Course Name	ENGINEERING CHEMISTRY (C122)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C122.1	Explain the principles of water chemistry, electrochemistry, and corrosion, and their significance in engineering applications.		BTL-2
C122.2	Apply the concepts of electrochemical cells, batteries, fuel cells, and corrosion control methods to engineering problems.		BTL-3
C122.3	Analyze the properties and engineering applications of polymers, conducting polymers, composites, lubricants, and nanomaterials.		BTL-4
C122.4	Evaluate the characteristics and applications of fuels, energy sources, and green chemistry practices for sustainable development.		BTL-5
C122.5	Apply instrumental analytical techniques and chemical principles for qualitative and quantitative analysis in engineering.		BTL-3
C122.6	Develop appropriate material selection and chemical solutions for engineering applications considering performance, environmental impact, and sustainability.		BTL-6

Course Name	COMPUTER AIDED ENGINEERING GRAPHICS (C123)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C123.1	Explain the principles of engineering graphics, BIS standards, and CAD tools for graphical representation of engineering components		BTL-2
C123.2	Construct orthographic projections of points, lines, planes, and solids using CAD software		BTL-3
C123.3	Analyze and generate sectional views and development of surfaces for engineering objects using CAD techniques		BTL-4
C123.4	Apply isometric projection principles to visualize and represent three-dimensional engineering objects		BTL-3
C123.5	Evaluate engineering drawings by interpreting projections, sections, dimensions, and geometric relationships using CAD tools		BTL-5
C123.6	Design complete engineering drawings of machine components and simple assemblies using Computer Aided Drafting software in accordance with engineering standards		BTL-6

Course Name	BASIC ELECTRICAL ENGINEERING (C124)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C124.1	Identify and use electrical measuring instruments and laboratory equipment safely for performing basic electrical experiments.		BTL-3
C124.2	Verify and analyze electrical circuit laws, network theorems, and characteristics of DC circuits through experimental procedures.		BTL-4
C124.3	Perform experiments on AC circuits and determine electrical parameters such as impedance, power factor, and resonance characteristics.		BTL-3
C124.4	Analyze the performance characteristics of transformers and electrical machines through experimental observations.		BTL-4
C124.5	Evaluate experimental results, compare theoretical and practical values, and interpret errors using appropriate measurement techniques.		BTL-5
C124.6	Design and implement simple electrical circuits considering safety standards, energy efficiency, and practical engineering applications.		BTL-6

Course Name	ELECTRONIC DEVICES AND CIRCUITS (C125)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level

C125.1	Know the characteristics of diode components.	BTL-2
C125.2	Design the applications of diode	BTL--3
C125.3	Understand the BJT configurations.	BTL-4
C125.4	Design and analyze FET characteristics	BTL-3
C125.5	Design and analyze MOSFET characteristics	BTL-5
C125.6	Design special purpose diodes	BTL-6

Course Name	APPLIED PYTHON PROGRAMMING LABORATORY (C126)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C126.1	Install Python, required libraries, and development tools for programming applications.		BTL-3
C126.2	Develop Python programs using basic programming constructs, functions, and file handling techniques.		BTL-3
C126.3	Apply NumPy and SciPy libraries to perform matrix operations, data analysis, and scientific computations.		BTL-3
C126.4	Analyze and visualize data using Matplotlib, statistical functions, and text-processing techniques.		BTL-4
C126.5	Interface Raspberry Pi with GPIO pins and sensors using Python for embedded system applications.		BTL-5
C126.6	Design and implement Python-based solutions for scientific computing, data analysis, and IoT applications.		BTL-6

Course Name	ENGINEERING CHEMISTRY LABORATORY (C127)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C127.1	Demonstrate safe laboratory practices and perform basic chemistry experiments using standard laboratory procedures and instruments.		BTL-3
C127.2	Conduct quantitative analysis of water quality parameters such as hardness, alkalinity, chloride content, and pH using standard analytical methods		BTL-3
C127.3	Analyze experimental data obtained from electrochemical, corrosion, and instrumental analysis experiments to draw valid conclusions		BTL-4
C127.4	Evaluate the properties of engineering materials, fuels, lubricants, and polymers through laboratory experiments and interpret the results		BTL-5
C127.5	Apply instrumental techniques and analytical methods to estimate unknown chemical parameters with accuracy and precision		BTL-3
C127.6	Design and present laboratory reports by interpreting experimental observations, analyzing errors, and recommending suitable engineering applications.		BTL-6

Course Name	BASIC ELECTRICAL ENGINEERING LABORATORY (C128)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C128.1	Identify and use electrical measuring instruments and laboratory equipment safely for performing basic electrical experiments.		BTL-3
C128.2	Verify and analyze electrical circuit laws, network theorems, and		BTL-4

	characteristics of DC circuits through experimental procedures.	
C128.3	Perform experiments on AC circuits and determine electrical parameters such as impedance, power factor, and resonance characteristics.	BTL-3
C128.4	Analyze the performance characteristics of transformers and electrical machines through experimental observations.	BTL-4
C128.5	Evaluate experimental results, compare theoretical and practical values, and interpret errors using appropriate measurement techniques.	BTL-5
C128.6	Design and implement simple electrical circuits considering safety standards, energy efficiency, and practical engineering applications.	BTL-6

Course Name	ELECTRONIC DEVICES AND CIRCUITS LABORATORY(C129)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C129.1	After Completion of the course the student can Apply various devices to real time problems		BTL-3
C129.2	Design the principles of rectifier circuits using diodes and implement them using hardware		BTL-4
C129.3	Design different transistor characteristics		BTL-5
C129.4	Design various characteristics like common source FET and implement them using hardware		BTL-4
C129.5	Design of Clippers and Clampers		BTL-3
C129.6	Analyze the concepts of unipolar junction transistor, MOSFET and observe its characteristics		BTL-6

Course Code	II Year I Semester Courses
C211	NUMERICAL METHODS AND COMPLEX VARIABLES
C212	ANALOG CIRCUITS
C213	NETWORK ANALYSIS AND SYNTHESIS
C214	DIGITAL LOGIC DESIGN
C215	SIGNALS AND SYSTEMS
C216	ANALOG CIRCUITS LABORATORY
C217	DIGITAL LOGIC DESIGN LABORATORY
C218	BASIC SIMULATION LABORATORY
C219	CONSTITUTION OF INDIA

Course Name	NUMERICAL METHODS AND COMPLEX VARIABLES (C211)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C211.1	Express any periodic function in terms of sine and cosine		BTL-2
C211.2	Find the root of a given polynomial and transcendental equations.		BTL-4
C211.3	Estimate the value for the given data using interpolation		BTL-3
C211.4	Find the numerical solutions for a given first order ODE's		BTL-3
C211.5	Analyze the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems		BTL-4
C211.6	Taylor's and Laurent's series expansions in complex function		BTL-2

Course Name	ANALOG CIRCUITS (C212)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C212.1	Design the amplifiers with various biasing techniques.		BTL-6
C212.2	Design single stage amplifiers using BJT and FET		BTL-6
C212.3	Gain the knowledge Cascade and folded cascade Amplifier		BTL-1
C212.4	Design multistage amplifiers and understand the concepts of High Frequency		BTL-6

	Analysis of BJT.	
C212.5	Utilize the Concepts of negative feedback to improve the stability of amplifiers and positive	BTL-3
C212.6	Design different Oscillator circuits	BTL-6

Course Name	NETWORK ANALYSIS AND SYSNTHESES (C213)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C213.1	Gain the knowledge on basic RLC circuits behavior.		BTL-1
C213.2	Analyze the Steady state and transient analysis of RLC Circuits.		BTL-4
C213.3	Characterization of two port network parameters.		BTL-2
C213.4	Infer and evaluate transient response, Steady state response, network functions		BTL-5
C213.5	Analyze the Design aspect of various filters and attenuators		BTL-4
C213.6	Synthesize one port network using Foster and Causer Forms.		BTL-6

Course Name	DIGITAL LOGIC DESIGN (C214)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C214.1	Acquire knowledge of numerical information in different forms and Boolean Algebra theorems.		BTL-1
C214.2	Define Postulates of Boolean algebra and minimize combinational functions and design the combinational circuits.		BTL-6
C214.3	Design and analyze sequential circuits for various cyclic functions.		BTL-6
C214.4	Characterizing sequential circuits and designing counters and clock-based registers		BTL-6
C214.5	Characterize logic families and analyze them for the purpose of AC and DC parameters.		BTL-4
C214.6	Analyzing different combinational and sequential circuits		BTL-4

Course Name	SIGNALS AND SYSTEMS (C215)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C215.1	Characterize various signals, systems and their time and frequency domain analysis, using transform techniques.		BTL-4
C215.2	Identify the conditions for transmission of signals through systems and conditions for physical realization of systems.		BTL-2
C215.3	Determining Laplace transforms and their properties using the concept of ROC		BTL-3
C215.4	Determining Z transforms and their properties using the concept of ROC and relating them to Laplace transforms		BTL-3
C215.5	Use sampling theorem for baseband and band-pass signals for various types of sampling and for different duty cycles.		BTL-3
C215.6	Apply the correlation and PSD functions for various applications.		BTL-3

Course Name	ANALOG CIRCUITS LABORATORY (C216)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C216.1	Design amplifiers with required Q points and analyze amplifier characteristics		BTL-6
C216.2	Examine the effect multistage amplification on frequency response		BTL-4
C216.3	understand different MOSFET amplifier configurations		BTL-2
C216.4	Investigate feedback concepts in amplifiers and oscillator		BTL-4
C216.5	Design different Oscillator circuits		BTL-6
C216.6	Design different Feedback circuits		BTL-6

Course Name	DIGITAL LOGIC DESIGN LABORATORY (C217)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C217.1	Acquire knowledge on numerical information in different forms and Boolean Algebra theorems.		BTL-1
C217.2	Define Postulates of Boolean algebra and minimize combinational functions and design the combinational circuits.		BTL-6
C217.3	Understand different types of Synchronous & Asynchronous Counters		BTL-2
C217.4	Understand state Machines		BTL-2

C217.5	Design and analyze sequential circuits for various cyclic functions.	BTL-6
C217.6	Characterize logic families and analyze them for the purpose of AC and DC parameters.	BTL-4

Course Name	BASIC SIMULATION LABORATORY (C218)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C218.1	Generate, analyze and perform various operations on Signals/Sequences both in time and Frequency domain		BTL-4
C218.2	Analyze and Characterize Continuous and Discrete Time Systems both in Time and Frequency domain along with the concept of Sampling		BTL-4
C218.3	Generate different Random Signals and capable of analyzing their Characteristics		BTL-3
C218.4	Apply the Concepts of Deterministic and Random Signals for Noise removal Applications and on other Real Time Signals		BTL-3
C218.5	Evaluate the Convolution and Correlation between Signals and sequences		BTL-5
C218.6	Analyze the Fourier Transform& Laplace Transform of a given signal and plotting its magnitude and phase spectrum		BTL-4

Course Name	CONSTITUTION OF INDIA (C219)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C219.1	Gain basic knowledge about the Constitution of India		BTL-1
C219.2	Understand about their obligations, responsibilities, privileges and rights, duties		BTL-2
C219.3	Get insights into the administrative and judicial setup of the country.		BTL-1
C219.4	Inculcate national and patriotic spirit among the students as responsible citizens of the country		BTL-2
C219.5	Understand the importance Local Self Government - Constitutional Scheme in India		BTL-2
C219.6	understand Article 19 & Article 21		BTL-2

Course Code	II Year II Semester Courses
C221	PROBABILITY THEORY AND STOCHASTIC PROCESSES
C222	ELECTROMAGNETIC FIELDS AND TRANSMISSION LINES
C223	ANALOG AND DIGITAL COMMUNICATIONS
C224	LINEAR AND DIGITAL IC APPLICATIONS
C225	ELECTRONIC CIRCUIT ANALYSIS
C226	ANALOG AND DIGITAL COMMUNICATIONS LABORATORY
C227	LINEAR AND DIGITAL IC APPLICATIONS LABORATORY
C228	ELECTRONIC CIRCUIT ANALYSIS LABORATORY
C229	REAL TIME PROJECT/ FIELD BASED PROJECT
C22A	GENDER SENSITIZATION LAB

Course Name	PROBABILITY THEORY AND STOCHASTIC PROCESSES (C221)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C221.1	Perform operations on single and multiple Random variables.		BTL-3
C221.2	Determine the Spectral and temporal characteristics of Random Signals.		BTL-3
C221.3	Characterize LTI systems driven by stationary random process by using ACFs and PSDs.		BTL-4
C221.4	Understand the concepts of Noise and Information theory in Communication systems.		BTL-2
C221.5	Understanding the concept of random processes		BTL-2
C221.6	Determining covariance and spectral density of stationary random processes		BTL-3

Course Name	ELECTROMAGNETIC FIELDS AND TRANSMISSION LINES (C222)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C222.1	Acquire the knowledge of Basic Laws, Concept sand proofs related to Electrostatic Fields and Magneto static Fields.		BTL-1
C222.2	Characterize the static and time-varying fields, establish the corresponding sets of		BTL-4

	Maxwell's Equations and Boundary Conditions.	
C222.3	Analyze the Wave Equations and classify conductors, dielectrics and evaluate the UPW Characteristics for several practical media of interest.	BTL-5
C222.4	Applying the maxwell equations to solve problems in electromagnetic field theory	BTL-3
C222.5	Analyzing the propagation of waves in different media	BTL-4
C222.6	Describing the transmission lines with equivalent circuit and explaining their characteristic	BTL-2

Course Name	ANALOG AND DIGITAL COMMUNICATIONS (C223)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C223.1	Design and analyze various Analog and Digital Modulation and Demodulation techniques.		BTL-6
C223.2	Modeling the noise present in continuous wave Modulation techniques.		BTL-3
C223.3	Implement the Super heterodyne Receiver concept and Pulse Modulation Techniques in various applications		BTL-3
C223.4	Analyze and design the base band Transmission		BTL-6
C223.5	Explaining sampling, PCM, delta modulation, adaptive delta modulation, and super heterodyne receiver		BTL-2
C223.6	Demonstrating various digital communication techniques		BTL-3

Course Name	LINEAR AND DIGITAL IC APPLICATIONS (C224)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C224.1	A thorough understanding of operational amplifiers with linear integrated circuits.		BTL-2
C224.2	Attain the knowledge of functional diagrams and design applications of IC555 and IC565.		BTL-6
C224.3	Acquire knowledge and design the Data converters.		BTL-6
C224.4	Choose the proper digital integrated circuits by knowing their characteristics.		BTL-3
C224.5	Designing circuits using linear or digital ICs		BTL-6
C224.6	Analyzing circuits based on linear and digital IC applications		BTL-4

Course Name	ELECTRONIC CIRCUIT ANALYSIS (C225)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C225.1	Design the power amplifiers		BTL-6
C225.2	Design the tuned amplifiers and analyze its frequency response		BTL-6
C225.3	Design Multivibrators and sweep circuits for various applications.		BTL-6
C225.4	Utilize the concepts of synchronization, frequency division and sampling gates		BTL-3
C225.5	Able to synthesize typical waveforms using Laplace transformation		BTL-6
C225.6	Understand different time base generators		BTL-2

Course Name	ANALOG AND DIGITAL COMMUNICATIONS LABORATORY (C226)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C226.1	Design and implement various Analog modulation and demodulation Techniques and observe the time and frequency domain characteristics		BTL-6
C226.2	Design and implement various Pulse modulation and demodulation Techniques and observe the time and frequency domain characteristics		BTL-6
C226.3	Design different digital pulse modulation techniques		BTL-6
C226.4	Understand DPCM modulation and demodulation		BTL-2
C226.5	Apply different types of Sampling with various Sampling rates and duty Cycles		BTL-3
C226.6	Design and implement various Digital modulation and demodulation Techniques and observe		BTL-6

Course Name	LINEAR AND DIGITAL IC APPLICATIONS LABORATORY (C227)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C227.1	Design and implementation of various analog circuits using 741 ICs.		BTL-6
C227.2	Design and implementation of various Multivibrators using 555 timers.		BTL-6
C227.3	Design different Shift registers using ICs		BTL-6

C227.4	Design different Counters using ICs	BTL-6
C227.5	Design and implement various circuits using digital ICs.	BTL-6
C227.6	Design and implement ADC, DAC and voltage regulators.	BTL-6

Course Name	ELECTRONIC CIRCUIT ANALYSIS LABORATORY (C228)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C228.1	Design power amplifiers and find its efficiency		BTL-6
C228.2	Design tuned amplifiers and find its Q-factor		BTL-6
C228.3	Design various multivibrators and sweep circuits and understand linearity.		BTL-6
C228.4	Design sampling gates and understanding the concepts of frequency division		BTL-6
C228.5	Understand response of Bootstrap and Schmitt Trigger circuits		BTL-2
C228.6	Understand different multiplexing techniques		BTL-2

Course Name	REAL TIME PROJECT/ FIELD BASED PROJECT(C229)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C229.1	Identify real-world engineering problems through field study and requirement analysis.		BTL-2
C229.2	Design feasible solutions using engineering knowledge and modern tools.		BTL-6
C229.3	Implement solutions through systematic planning and development.		BTL-6
C229.4	Analyze data to evaluate solution performance and effectiveness.		BTL-5
C229.5	Work individually and in teams with ethical and professional responsibility.		BTL-3
C229.6	Communicate project work effectively through reports and presentations.		BTL-3

Course Name	GENDER SENSITIZATION LAB (C22A)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C22A.1	Students will have developed a better understanding of important issues related to gender in contemporary India.		BTL-6
C22A.2	Students will understand the biological, sociological, psychological, and legal aspects of gender through discussions based on research, real-life experiences, literature, and films.		BTL-2
C22A.3	Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.		BTL-4
C22A.4	Students will acquire insight into the gendered division of labor and its relation to politics and economics		BTL-2
C22A.5	Men and women students and professionals will be better equipped to work and live together as equals.		BTL-3
C22A.6	Students will develop a sense of appreciation of women in all walks of life.		BTL-6

Course Code	III Year I Semester Courses
C311	MICROCONTROLLERS
C312	IOT ARCHITECTURES AND PROTOCOLS
C313	CONTROL SYSTEMS
C314	BUSINESS ECONOMICS AND FINANCIAL ANALYSIS
C315	ELECTRONIC MEASUREMENTS AND INSTRUMENTATION (PE 1)
C316	MICROCONTROLLERS LABORATORY
C317	IOT ARCHITECTURES AND PROTOCOLS LABORATORY
C318	ADVANCED ENGLISH COMMUNICATION SKILLS LABORATORY
C319	INTELLECTUAL PROPERTY RIGHTS

Course Name	MICROCONTROLLERS (C311)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C311.1	Understands the internal architecture, organization and assembly language programming of 8086 processors		BTL-2
C311.2	Understands the internal architecture, organization and assembly language programming of 8051/controllers		BTL-2
C311.3	Understands the interfacing techniques to 8086 and 8051 based systems.		BTL-2

C311.4	Understands the internal architecture of ARM processors and basic concepts of advanced ARM processors	BTL-2
C311.5	Understand the concepts of Advanced ARM processors	BTL-2
C311.6	Understands the knowledge about interfacing techniques of bus & memory	BTL-2

Course Name	IOT ARCHITECTURES AND PROTOCOLS (C312)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C312.1	Explore the Evolution of IOT, its Growth and Applications.		BTL-1
C312.2	Know the components of IOT and Compare the differences and similarities between IOT and M2M.		BTL-4
C312.3	Acquire the knowledge on data management of IOT.		BTL-1
C312.4	Establish the knowledge on various IOT protocols like Data link, Network layer protocols		BTL-1
C312.5	Acquire the knowledge on transport and session layer protocols		BTL-1
C312.6	Acquire the knowledge on service layer protocols and security		BTL-1

Course Name	CONTROL SYSTEMS (C313)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C313.1	Differentiate open and Closed loop systems and able to write some practical examples of these two systems		BTL-4
C313.2	Design linear-time-invariant systems using transfer function		BTL-6
C313.3	Construct Root Loci and Evaluate stability using Routh-Hurwitz Criteria		BTL-6
C313.4	Understand the concept of stability and its assessment for linear-time invariant systems		BTL-5
C313.5	Evaluate Gain and Phase margins from Bode, Polar and Nyquist plots		BTL-5
C313.6	Design simple feedback controllers		BTL-6

Course Name	BUSINESS ECONOMICS AND FINANCIAL ANALYSIS (C314)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C314.1	To learn the basic business types, impact of the economy on Business and Firms specifically		BTL-1
C314.2	To analyze the Business from the Financial Perspective.		BTL-4
C314.3	To understand the concepts of managerial economics and the market dynamics namely demand elasticity of demand and pricing in different market structures		BTL-2
C314.4	To gain knowledge on the production theories and cost analysis while dealing with production and the concept of breakeven analysis		BTL-1
C314.5	To examine the price-output decisions under different types of marketing structures and the significance of different forms of business organizations existing in the modern business		BTL-4
C314.6	To describe the significance of the project management, capital budgeting, estimation of the projects through capital budgeting methods for choosing the best and optimal projects		BTL-2

Course Name	ELECTRONIC MEASUREMENTS AND INSTRUMENTATION (PE 1) (C315)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C315.1	Measure electrical parameters with different meters and understand the basic definition of measuring parameters		BTL-3
C315.2	Use various types of signal generators, signal analyzers for generating and analyzing various real-time signals		BTL-4
C315.3	Operate an Oscilloscope to measure various signals.		BTL-3
C315.4	Measure various physical parameters by appropriately selecting the transducers.		BTL-3
C315.5	Understand the concepts of various measuring bridges and their balancing conditions.		BTL-2
C315.6	Understand various measuring techniques for measurement of different physical parameters using different classes of transducers		BTL-2

Course Name	MICROCONTROLLERS LABORATORY (C316)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C316.1	Analyze and apply the fundamentals of assembly level programming of microprocessors and microcontroller		BTL-4
C316.2	Explain the implementation of 8051 instruction Set		BTL-2
C316.3	Demonstrate standard microprocessor real time interfaces including serial ports, digital-to-analog converters and analog-to-digital converters.		BTL-3
C316.4	Analyze abstract problems and apply a combination of hardware and software to address the problem		BTL-4
C316.5	Identify troubleshoots interactions between software and hardware.		BTL-2
C316.6	Make use of standard test and measurement equipment to evaluate digital interfaces.		BTL-5

Course Name	IOT ARCHITECTURES AND PROTOCOLS LABORATORY (C317)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C317.1	Utilize the different sensors like room temperature, DHT, Humidity etc.,		BTL-3
C317.2	Students get the basics of IP addressing		BTL-1
C317.3	Interface the sensors and processors for transmission of data		BTL-3
C317.4	Students get a thorough understanding of the routing protocols and implement them successfully		BTL-3
C317.5	Capture the images and process it on Arduino/Node MCU/Raspberry Pi.		BTL-3
C317.6	know the utilization of various protocols like I2C, UART communication etc.,		BTL-1

Course Name	ADVANCED ENGLISH COMMUNICATION SKILLS LABORATORY (C318)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C318.1	Acquire vocabulary and use it contextually		BTL-3
C318.2	Listen and speak effectively		BTL-1
C318.3	Develop proficiency in academic reading and writing		BTL-6
C318.4	Increase possibilities of job prospects		BTL-3
C318.5	Communicate confidently in formal and informal contexts		BTL-3
C318.6	Respond appropriately in different socio-cultural and professional contexts		BTL-3

Course Name	INTELLECTUAL PROPERTY RIGHTS (C319)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C319.1	Distinguish and explain various forms of IPRs.		BTL-4
C319.2	Students get the knowledge on Trademarks and Trade Secrets.		BTL-1
C319.3	Identify criteria to fit one's own intellectual work in particular form of IPRs.		BTL-2
C319.4	Student gets. Awareness of Cyber laws and Cyber Crime, to protect the data from Cyber crime		BTL-1
C319.5	Appraise new developments in IPR laws at national and international level		BTL-6
C319.6	Students understand the Trademarks and Trade secrets. To create awareness of unfair completion and methods of it		BTL-6

Course Code	III Year II Semester Courses
C321	ANTENNAS AND WAVE PROPAGATION
C322	DIGITAL SIGNAL PROCESSING
C323	CMOS VLSI DESIGN
C324	EMBEDDED SYSTEM DESIGN (PE 2)
C325	ENVIRONMENTAL IMPACT ASSESSMENT (OE1)
C326	DIGITAL SIGNAL PROCESSING LABORATORY
C327	CMOS VLSI DESIGN LABORATORY
C328	ADVANCED COMMUNICATION LABORATORY
C329	INDUSTRY ORIENTED MINI PROJECT/INTERNSHIP
C32A	ENVIRONMENTAL SCIENCE

Course Name	ANTENNAS AND WAVE PROPAGATION	Regulation	R22
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	(C321)		
Course Code	Course Outcome Statement		BTL Level
C321.1	Characterize the antennas based on frequency, configure the geometry and establish the radiation patterns of VHF, UHF and Microwave antennas and also antenna arrays.		BTL-4
C321.2	Specify the requirements for microwave measurements and arrange a setup to carry out the antenna far zone pattern and gain measurements in the laboratory		BTL-3
C321.3	Classify the different wave propagation mechanisms, determine the characteristic features of different wave propagations, and estimate the parameters involved		BTL-4
C321.4	Understands the concepts and set-up requirements for microwave measurements and familiarize them with the procedure to enable antenna measurements.		BTL-3
C321.5	Students will be able to analyze the characteristics and design relations of UHF, VHF and Microwave Antennas		BTL-6
C321.6	Understand the concept of radiation, antenna definitions and significance of antenna parameters		BTL-2

Course Name	DIGITAL SIGNAL PROCESSING (C322)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C322.1	Perform time, frequency and Z- transform analysis on signals and systems		BTL-3
C322.2	Understand the inter relationship between DFT and various transforms.		BTL-2
C322.3	Understand the significance of various filter structures and effects of round off errors		BTL-2
C322.4	Design a digital filter for a given specification		BTL-6
C322.5	Understand the fast computation of DFT and appreciate the FFT processing		BTL-2
C322.6	Understand the tradeoffs between normal and multi rate DSP techniques and finite length word effects		BTL-2

Course Name	CMOS VLSI DESIGN (C323)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C323.1	Acquire qualitative knowledge about the fabrication process of integrated circuits using MOS transistors		BTL-1
C323.2	Draw the layout of any logic circuit which helps to understand and estimate parasitic effect of any logic circuit		BTL-3
C323.3	Design building blocks of data path systems, memory and simple logic circuits using PLA, PAL, FPGA and CPLD.		BTL-6
C323.4	Design simple memories using MOS transistors and can understand design of large memories.		BTL-6
C323.5	Understand basic programmable logic devices and testing of CMOS circuits		BTL-2
C323.6	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.		BTL-2

Course Name	EMBEDDED SYSTEM DESIGN (PE 2) (C324)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C324.1	To understand the selection procedure of Processors in the embedded domain		BTL-3
C324.2	Design Procedure for Embedded Firmware		BTL-6
C324.3	To visualize the role of Real time Operating Systems in Embedded Systems.		BTL-2
C324.4	To evaluate the Correlation between task synchronization and latency issues		BTL-5
C324.5	To understand the necessity of operating systems in correlation with hardware systems		BTL-2
C324.6	To provide clear understanding of the role of firmware.		BTL-2

Course Name	ENVIRONMENTAL IMPACT ASSESSMENT (OE-1)(C325)	Regulation	R22
Course Code	Course Outcome Statement		BTL LEVEL
C325.1	Explain the need, objectives, principles, procedures, components and regulatory framework of Environmental Impact Assessment (EIA).		BTL-2
C325.2	Identify and describe environmental attributes, baseline conditions and major stages involved in the EIA process.		BTL-2

C325.3	Apply suitable EIA methodologies such as ad-hoc, checklist, matrix, network and overlay methods for impact identification and assessment.	BTL-3
C325.4	Analyze environmental impacts associated with developmental projects and evaluate alternatives and mitigation measures.	BTL-4
C325.5	Develop Environmental Management Plans (EMP), monitoring programs, mitigation measures and rehabilitation plans for identified environmental impacts.	BTL-6
C325.6	Evaluate environmental legislation, life cycle assessment approaches and case studies of major developmental projects for sustainable environmental management.	BTL-5

Course Name	DIGITAL SIGNAL PROCESSING LABORATORY (C326)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C326.1	Analyze and process signals in the discrete domain		BTL-4
C326.2	Develop and experiment coding from basic mathematical operations to complex operations like DFT and FFT		BTL-6
C326.3	Visualize the amplitude and phase spectrum of the signal in frequency domain.		BTL-2
C326.4	Apply the principles of signal analysis to filtering		BTL-3
C326.5	Design IIR, and FIR filters for band pass, band stop, low pass and high pass filters		BTL-6
C326.6	Analyze the spectral parameter of window functions		BTL-4

Course Name	CMOS VLSI DESIGN LABORATORY (C327)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C327.1	Design of digital VLSI Circuits, stick diagram of circuits.		BTL-6
C327.2	Design the design rules of VLSI circuits.		BTL-6
C327.3	Analyze and simulate speed and power considerations Floor Planning and Layout techniques		BTL-4
C327.4	Be able to complete a significant VLSI design project having a set of objective criteria and design constraints		BTL-6
C327.5	Design the layout design rules for both static CMOS and dynamic clock CMOS circuit.		BTL-6
C327.6	Develop an ability to design analog and digital CMOS circuits		BTL-6

Course Name	ADVANCED COMMUNICATION LABORATORY (C328)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C328.1	Ability to understand the differences between Scripting languages and programming languages		BTL-2
C328.2	Able to gain some fluency programming in Ruby, Perl, TCL		BTL-3
C328.3	Understands the concepts of scripting languages for developing web-based projects		BTL-2
C328.4	Understand the applications of Ruby, TCL, Perl scripting languages		BTL-2
C328.5	Students will be able to write Perl programs to implement the following list of manipulating functions		BTL-3
C328.6	Students will be able to Ruby script to create a new string which is in copies		BTL-6

Course Name	INDUSTRY ORIENTED MINI PROJECT/INTERNSHIP (C329)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C329.1	Identify and analyze real-world industry problems relevant to the chosen engineering discipline.		BTL-4
C329.2	Apply theoretical knowledge and practical skills to design feasible solutions for industry-based problems.		BTL-6
C329.3	Use appropriate tools, technologies, and industry practices to implement the proposed solution effectively.		BTL-6
C329.4	Demonstrate teamwork, professional ethics, and effective communication in an industrial or project environment.		BTL-2

C329.5	Analyze results, validate outcomes, and suggest improvements based on industry standards and feedback.	BTL-5
C329.6	Prepare comprehensive technical documentation and present project/internship outcomes professionally.	BTL-3

Course Name	ENVIRONMENTAL SCIENCE (C32A)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C32A.1	Understands the importance of ecological balance for sustainable development.		BTL-2
C32A.2	Understands the impacts of developmental activities and mitigation measures		BTL-2
C32A.3	Understands the environmental policies and regulations		BTL-2
C32A.4	Understand and evaluate the global scale of environmental problems		BTL-5
C32A.5	Articulate the interconnected and interdisciplinary nature of environmental studies		BTL-2
C32A.6	Communicate complex environmental information to both technical and non-technical audiences		BTL-3

Course Code	IV Year I Semester Courses
C411	MICROWAVE AND OPTICAL COMMUNICATIONS
C412	RADAR SYSTEMS (PE 3)
C413	SATELLITE COMMUNICATION (PE 4)
C414	ARTIFICIAL INTELLIGENT AND APPLICATIONS (OE 2)
C415	PROFESSIONAL PRACTICE, LAW AND ETHICS
C416	MICROWAVE AND OPTICAL COMMUNICATIONS LAB
C417	PROJECT STAGE I

Course Name	MICROWAVE AND OPTICAL COMMUNICATIONS (C411)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C411.1	Known power generation at microwave frequencies and derive the performance characteristics		BTL-3
C411.2	Realize the need for solid state microwave sources and understand the principles of solid-state devices		BTL-2
C411.3	Distinguish between the different types of waveguide and ferrite components, and select proper components for engineering applications		BTL-4
C411.4	Understand the utility of S-parameters in microwave component design and learn the measurement procedure of various microwave parameters		BTL-2
C411.5	Understand the mechanism of light propagation through Optical Fibers		BTL-2
C411.6	Understand the Utility of Optical Fibers in Communications		BTL-2

Course Name	RADAR SYSTEMS (PE 3) (C412)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C412.1	Derive the complete radar range equation		BTL-3
C412.2	Familiarize the functioning of CW, FM-CW and MTI radars		BTL-2
C412.3	know about various Tracking methods.		BTL-1
C412.4	Derive the matched filter response characteristics for radar receivers.		BTL-3
C412.5	Understand about noise figure and noise temperature		BTL-2
C412.6	Understand about phased array antennas, Beam Steering and Beam Width changes		BTL-2

Course Name	SATELLITE COMMUNICATION (PE 4) (C413)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C413.1	Explore the basic concepts and frequency allocations for satellite communication, orbital mechanics and launch vehicles.		BTL-1
C413.2	Envision the satellite sub systems and design satellite links for specified C/N.		BTL-6
C413.3	Familiarize the various multiple access techniques for satellite communication systems and earth station technologies.		BTL-2
C413.4	Known the concepts of LEO, GEO Stationary Satellite Systems and satellite navigation		BTL-1
C413.5	Understand Operational NGSO Constellation Designs		BTL-2
C413.6	Understand the necessity of GPS Position, GPS C/A Code Accuracy, Differential GPS.		BTL-2

Course Name	INDUSTRIAL ENGINEERING MANAGEMENT (OE 2) (C414)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C414.1	Practice the management theories proposed by Taylor, Fayal etc.		BTL- 3
C414.2	Consider various factors and identify plant location for given industry.		BTL- 6
C414.3	Determine EOQ, classify items and implement P-system and Q-system.		BTL- 3
C414.4	Conduct work study (method study + work measurement: a) Time study & Work sampling)		BTL- 3
C414.5	Practice HRM principles		BTL - 3
C414.6	Analyze the networks by using PERT & CPM		BTL -4

Course Name	PROFESSIONAL PRACTICE, LAW AND ETHICS (C415)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C415.1	Understanding basic purpose of profession, professional ethics and various moral and social issues		BTL-2
C415.2	Awareness of professional rights and responsibilities of a Engineer, safety and risk benefit analysis of a Engineer		BTL-1
C415.3	Acquiring knowledge of various roles of Engineer in applying ethical principles at various professional levels		BTL-3
C415.4	Professional Ethical values and contemporary issues		BTL-1
C415.5	Excelling in competitive and challenging environment to contribute to industrial growth		BTL-3
C415.6	Understand the importance of Values and Ethics in their Personal lives and professional careers		BTL-2

Course Name	MICROWAVE AND OPTICAL COMMUNICATIONS LAB (C416)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C416.1	Illustrate the characteristics of various microwave sources such as reflex klystron and Gun diode characteristics through experiments on microwave bench.		BTL-2
C416.2	Measure Scattering parameters of various microwave components using microwave bench		BTL-3
C416.3	Measure electrical parameters of various microwave components using microwave bench		BTL-3
C416.4	Understand the mechanism of light propagation through optical fibers		BTL-2
C416.5	Understand the utility of optical fiber into communications		BTL-2
C416.6	Understand and analyze the constructional parameters of optical fibers		BTL-4

Course Name	PROJECT STAGE I (C417)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C417.1	Perform a literature survey to review current knowledge and developments in chosen technical area		BTL-6
C417.2	Undertake detailed technical work in theoretical studies, computer simulation, hardware construction		BTL-3
C417.3	Interpret the results of the study for the application purpose		BTL-2
C417.4	Deliver a seminar on general areas of work being undertaken and specific contributions to that field		BTL-3
C417.5	Demonstrate knowledge, skills and attitude of a professional engineer		BTL-2
C417.6	Effectively communicate by making an oral presentation to present the project completed		BTL-3

Course Code	IV Year II Semester Courses
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C421	MACHINE LEARNING (PE-5)
C422	WIRELESS SENSOR NETWORKS (PE-6)
C423	ENTREPRENUERSHIP DEVELOPMENT(OE-3)
C424	ROJECT STAGE- II INCLUDING SEMINAR

Course Name	MACHINE LEARNING (PE-5)(421)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C421.1	Explain the fundamental concepts, architectures and learning principles of Artificial Neural Networks and their applications.		BTL-2
C421.2	Select and apply suitable supervised and unsupervised learning networks for modeling real-world problems.		BTL-3
C421.3	Analyze linear, Bayesian and probabilistic models for solving machine learning problems.		BTL-4
C421.4	Apply kernel methods, Gaussian processes and Support Vector Machines for classification and regression problems.		BTL-3
C421.5	Evaluate graphical models, Bayesian networks and Markov Random Fields for representing and solving probabilistic inference problems.		BTL-5
C421.6	Develop appropriate machine learning models using neural networks, kernel methods and graphical models for real-world applications.		BTL-6

Course Name	WIRELESS SENSOR NETWORKS (PE-6) (C422)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C422.1	Analyze and compare different architectures, types, characteristics and applications of Wireless Sensor Networks.		BTL-4
C422.2	Explain the enabling technologies, design issues, constraints and challenges associated with Wireless Sensor Networks and MANETs.		BTL-2
C422.3	Analyze and compare different routing and MAC protocols used in Wireless Sensor Networks, including S-MAC, B-MAC and IEEE 802.15.4.		BTL-4
C422.4	Analyze various data gathering, data dissemination and data fusion techniques and evaluate their impact on the quality and performance of sensor networks.		BTL-5
C422.5	Design and evaluate Wireless Sensor Network solutions incorporating gateways, Internet connectivity, hardware components, operating systems and execution environments.		BTL-6
C422.6	Develop and simulate Wireless Sensor Network applications using suitable protocols, node architectures, TinyOS and nesC.		BTL-6

Course Name	ENTREPRENUERSHIP DEVELOPMENT(OE-3) (C423)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C423.1	Identify the factors affecting entrepreneurial growth		BTL- 1
C423.2	Understand various programs supporting entrepreneurship		BTL- 2
C423.3	Understand small business enterprises and their ownership structures.		BTL -2
C423.4	Analyze business opportunity identification and project formulation steps.		BTL -4
C423.5	Estimate the finances for the project		BTL- 3
C423.6	Appraise and avail support rendered by the Government and other Appropriate Agencies		BTL- 5

Course Name	PROJECT STAGE- II INCLUDING SEMINAR(424)	Regulation	R22
Course Code	Course Outcome Statement		BTL Level
C424.1	Identify and define a relevant project problem based on practical needs.		BTL -1
C424.2	Review and analyze existing literature related to the project domain.		BTL -4

C424.3	Formulate clear project objectives and scope.	BTL -3
C424.4	Design an appropriate methodology and project plan.	BTL- 6
C424.5	Perform feasibility analysis considering technical and economic aspects.	BTL -5
C424.6	Document and present the project progress effectively.	BTL -3

Coordinator

Head of the Department