## LIST OF COURSE OUTCOMES (COs) – R-18 REGULATION:

| Course Code | I Year I Semester Courses |
|---|---|
| C111 | MATHEMATICS - I |
| C112 | APPLIED PHYSICS |
| C113 | PROGRAMMING FOR PROBLEM SOLVING |
| C114 | ENGINEERING GRAPHICS |
| C115 | APPLIED PHYSICS LAB |
| C116 | PROGRAMMING FOR PROBLEM SOLVING LAB |
| C117 | ENVIRONMENTAL SCIENCE |

| Course Name | MATHEMATICS – I (C111) | Regulation | R18 |
|---|---|---|---|
| Course Code | Course Outcome Statement | | |
| C111.1 | Write the matrix representation of a set of linear equations and analyze the solution of the system of equations | | |
| C111.2 | Find the Eigen values and Eigen vectors and reduce the quadratic form to canonical form using orthogonal transformations. | | |
| C111.3 | Analyze the nature of sequence and series. | | |
| C111.4 | Solve the applications on the mean value theorems | | |
| C111.5 | Evaluate the improper integrals using Beta and Gamma functions | | |
| C111.6 | Find the extreme values of functions of two variables with/ without constraints. | | |

| Course Name | APPLIED PHYSICS (C112) | Regulation | R18 |
|---|---|---|---|
| Course Code | Course Outcome Statement | | |
| C112.1 | Understand basic concepts of quantum mechanics. | | |
| C112.2 | Analyze simple quantum mechanical systems. | | |
| C112.3 | Explain semiconductor physics and electronic devices. | | |
| C112.4 | Describe optoelectronic devices and their applications. | | |
| C112.5 | Understand laser and fibre optic principles. | | |
| C112.6 | Explain electromagnetism and magnetic properties of materials. | | |

| Course Name | PROGRAMMING FOR PROBLEM SOLVING(C113) | Regulation | R18 |
|---|---|---|---|
| Course Code | Course Outcome Statement | | |
| C113.1 | To write algorithms and to draw flowcharts for solving problems. | | |
| C113.2 | To convert the algorithms/flowcharts to C programs. | | |
| C113.3 | To code and test a given logic in C programming language | | |
| C113.4 | To decompose a problem into functions and to develop modular reusable code. | | |
| C113.5 | To use arrays, pointers, strings and structures to write C programs. | | |
| C113.6 | Searching and sorting problems. | | |

| Course Name | ENGINEERING GRAPHICS (C114) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C114.1** | Understand the principles and importance of engineering graphics and construction of scales. | | |
| **C114.2** | Draw conic sections and cycloidal curves using standard methods. | | |
| **C114.3** | Apply orthographic projection techniques for points, lines, and plane figures. | | |
| **C114.4** | Draw projections and sectional views of regular solids. | | |
| **C114.5** | Develop surfaces and draw intersections of simple solids. | | |
| **C114.6** | Create and interpret isometric projections and convert them into orthographic views. | | |

| Course Name | APPLIED PHYSICS LAB (C115) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C115.1** | Measure semiconductor and device parameters. | | |
| **C115.2** | Plot and analyze V–I characteristics. | | |
| **C115.3** | Study optical and optoelectronic devices | | |
| **C115.4** | Verify photoelectric and magnetic effects. | | |
| **C115.5** | Determine R-C and LCR circuit parameters. | | |
| **C115.6** | Develop experimental and analytical skills. | | |

| Course Name | PROGRAMMING FOR PROBLEM SOLVING LAB(C116) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C116.1** | Formulate algorithms for solving simple problems. | | |
| **C116.2** | Translate algorithms into correct and executable programs. | | |
| **C116.3** | Identify and correct syntax and logical errors in programs. | | |
| **C116.4** | Use arrays, strings, structures, and pointers for data manipulation. | | |
| **C116.5** | Perform file operations using text and binary files. | | |
| **C116.6** | Develop modular and reusable code using functions | | |

| Course Name | ENVIRONMENTAL SCIENCE (C117) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C117.1** | Understand the structure, functions, and services of ecosystems and ecological processes. | | |
| **C117.2** | Analyze the use, conservation, and management of natural and energy resources. | | |
| **C117.3** | Explain biodiversity, its values, threats, and conservation strategies. | | |
| **C117.4** | Identify types of environmental pollution and evaluate control technologies. | | |
| **C117.5** | Understand global environmental issues, climate change, and international environmental efforts. | | |
| **C117.6** | Interpret environmental policies, legislation, EIA processes, and concepts of sustainable development. | | |

| Course Code | I Year II Semester Courses |
|---|---|
| **C121** | MATHEMATICS - II |
| **C122** | CHEMISTRY |
| **C123** | BASIC ELECTRICAL ENGINEERING |
| **C124** | ENGINEERING WORKSHOP |
| **C125** | ENGLISH |
| **C126** | ENGINEERING CHEMISTRY LAB |
| **C127** | ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB |
| **C128** | BASIC ELECTRICAL ENGINEERING LAB |

| **Course Name** | **MATHEMATICS – II (C121)** | **Regulation** | **R18** |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C121.1** | Identify whether the given differential equation of first order is exact or not | | |
| **C121.2** | Solve higher differential equation and apply the concept of differential equation to real world problems | | |
| **C121.3** | Evaluate double and triple integrals and apply coordinate transformations. | | |
| **C121.4** | Apply multiple integrals to compute areas, volumes, and centers of mass. | | |
| **C121.5** | Analyze vector fields using gradient, divergence, curl, and related identities. | | |
| **C121.6** | Evaluate the line, surface and volume integrals and converting them from one to another | | |

| **Course Name** | **CHEMISTRY (C122)** | **Regulation** | **R18** |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C122.1** | Explain molecular bonding theories, crystal field theory, and band structure of solids. | | |
| **C122.2** | Analyze water quality parameters and apply suitable water treatment methods. | | |
| **C122.3** | Understand electrochemical principles, batteries, and corrosion mechanisms with control methods. | | |
| **C122.4** | Apply concepts of stereochemistry and reaction mechanisms in organic synthesis. | | |
| **C122.5** | Explain the synthesis and pharmaceutical importance of common drug molecules. | | |
| **C122.6** | Understand the principles and applications of spectroscopic techniques. | | |

| **Course Name** | **BASIC ELECTRICAL ENGINEERING (C123)** | **Regulation** | **R18** |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C123.1** | Analyze DC circuits using network theorems and time-domain techniques. | | |
| **C123.2** | Analyze AC circuits using phasor concepts, power calculations, and resonance. | | |
| **C123.3** | Explain the construction, operation, and performance of transformers. | | |
| **C123.4** | Describe the working principles and characteristics of electrical machines. | | |
| **C123.5** | Understand the operation of synchronous generators and induction motors. | | |
| **C123.6** | Apply basic concepts of electrical installations, wiring, earthing, and energy calculations. | | |

| Course Name | ENGINEERING WORKSHOP (C124) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C124.1** | Identify and use hand tools, power tools, and machine tools safely for basic workshop operations. | | |
| **C124.2** | Fabricate simple engineering components using carpentry, fitting, tin-smithy, and foundry processes. | | |
| **C124.3** | Perform basic welding and joining operations using arc and gas welding techniques. | | |
| **C124.4** | Apply basic electrical knowledge to carry out house-wiring practices and testing. | | |
| **C124.5** | Select appropriate materials, tools, and measuring instruments to work within prescribed tolerances. | | |
| **C124.6** | Demonstrate teamwork, safety awareness, precision, and good workshop practices. | | |

| Course Name | ENGLISH (C125) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C125.1** | Use English Language effectively in spoken and written forms. | | |
| **C125.2** | Comprehend the given texts and respond appropriately. | | |
| **C125.3** | Communicate confidently in various contexts and different cultures | | |
| **C125.4** | Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills. | | |
| **C125.5** | Use correct grammar and vocabulary in academic and technical writing | | |
| **C125.6** | Analyze and summarize texts using effective reading strategies. | | |

| Course Name | ENGINEERING CHEMISTRY LAB (C126) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C126.1** | Determine water quality parameters such as hardness and chloride content. | | |
| **C126.2** | Estimate rate constants of chemical reactions from concentration–time data | | |
| **C126.3** | Measure physical properties such as adsorption, viscosity, and surface tension | | |
| **C126.4** | Perform potentiometric and conductometric titrations for chemical analysis. | | |
| **C126.5** | Synthesize organic compounds and evaluate their purity using TLC. | | |
| **C126.6** | Analyze experimental data accurately and follow safe laboratory practices. | | |

| Course Name | ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB (C127) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C127.1** | Understand and apply listening strategies for effective comprehension. | | |
| **C127.2** | Recognize and produce English speech sounds with correct stress and intonation. | | |
| **C127.3** | Communicate fluently and confidently in formal and informal situations. | | |
| **C127.4** | Demonstrate effective pronunciation with reduced mother tongue influence. | | |
| **C127.5** | Apply communication skills in public speaking, presentations, and interviews. | | |
| **C127.6** | Use appropriate verbal and non-verbal communication in professional contexts. | | |

| Course Name | BASIC ELECTRICAL ENGINEERING LAB (C211) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C128.1** | Verify fundamental electrical laws such as Ohm's law, KVL, and KCL through experiments. | | |
| **C128.2** | Analyze transient and steady-state responses of RL, RC, and RLC circuits. | | |
| **C128.3** | Measure and calculate basic electrical parameters like voltage, current, power, and impedance. | | |
| **C128.4** | Evaluate performance characteristics of single-phase and three-phase transformers. | | |
| **C128.5** | Analyze performance and torque–speed characteristics of DC and induction motors. | | |
| **C128.6** | Conduct experiments on three-phase systems and alternators following standard laboratory practices. | | |

| Course Code | II Year I Semester Courses |
|---|---|
| **C211** | ELECTRONIC DEVICES AND CIRCUITS |
| **C212** | NETWORK ANALYSIS AND TRANSMISSION LINES |
| **C213** | DIGITAL SYSTEM DESIGN |
| **C214** | SIGNALS AND SYSTEMS |
| **C215** | PROBABILITY THEORY AND STOCHASTIC PROCESSES |
| **C216** | ELECTRONIC DEVICES AND CIRCUITS LAB |
| **C217** | DIGITAL SYSTEM DESIGN LAB |
| **C218** | BASIC SIMULATION LAB |
| **C219** | CONSTITUTION OF INDIA |

| Course Name | ELECTRONIC DEVICES AND CIRCUITS (C211) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C211.1** | Know the characteristics of various components. | | |
| **C211.2** | Understand the utilization of components. | | |
| **C211.3** | Know the applications of components. | | |
| **C211.4** | Understand the biasing techniques. | | |
| **C211.5** | Analysis and design of small signal low frequency BJT Amplifiers. | | |
| **C211.6** | Design and analyze FET amplifier circuits | | |

| Course Name | NETWORK ANALYSIS AND TRANSMISSION LINES (C212) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C212.1** | Gain the knowledge on basic RLC circuits behavior. | | |
| **C212.2** | Analyze the Steady state and transient analysis of RLC Circuits | | |
| **C212.3** | Know the characteristics of two port network parameters | | |
| **C212.4** | Analyze the transmission line parameters and configurations. | | |
| **C212.5** | Integrate the wave propagation through transmission lines. | | |
| **C212.6** | Compute the smith chart and impedance matching the device | | |

| Course Name | DIGITAL SYSTEM DESIGN (C213) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C213.1** | Understand the numerical information in different forms and Boolean algebra theorems | | |
| **C213.2** | Postulates of Boolean algebra and to minimize combinational functions | | |
| **C213.3** | Design and analyze combinational and sequential circuits | | |
| **C213.4** | Know about the logic families and realization of logic gates | | |
| **C213.5** | Understands Analyze and solve various engineering problems with finite state machine | | |
| **C213.6** | Design and analyze Logic gates with different technologies | | |

| Course Name | SIGNALS AND SYSTEMS (C214) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C214.1** | Differentiate various signal functions. | | |
| **C214.2** | Represent any arbitrary signal in time and frequency domain | | |
| **C214.3** | Understand the characteristics of linear time invariant systems | | |
| **C214.4** | Analyze the signals with different transformation technique | | |
| **C214.5** | Understand the importance of sampling, sampling theorem and its effects. | | |
| **C214.6** | Understand the concepts of Random process and its characteristics | | |

| Course Name | PROBABILITY THEORY AND STOCHASTIC PROCESSES (C215) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C215.1** | Understand the concepts of Random Process and its Characteristics | | |
| **C215.2** | Understand the response of linear time Invariant system for Random Processes. | | |
| **C215.3** | Determine the Spectral and temporal characteristics of Random Signals | | |
| **C215.4** | Understand the concepts of Noise in Communication systems | | |
| **C215.5** | Apply the concepts of random processes in communication and signal processing | | |
| **C215.6** | Apply the principles of a random process in system concepts | | |

| Course Name | ELECTRONIC DEVICES AND CIRCUITS LAB (C216) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C216.1** | After Completion of the course the student can Apply various devices to real time problems | | |
| **C216.2** | Analyze the diode and transistor characteristics | | |
| **C216.3** | Design the principles of rectifier circuits using diodes and implement them using hardware | | |
| **C216.4** | Design various amplifiers like CE, CC, common source FET amplifiers AND implement them using hardware and observe their frequency responses | | |
| **C216.5** | Design of Clippers and Clampers | | |
| **C216.6** | Analyze the concepts of unipolar junction transistor and observe its characteristics | | |

| Course Name | DIGITAL SYSTEM DESIGN LAB (C217) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C217.1** | Design the Logic gates | | |
| **C217.2** | Analyze how a binary code is converted to gray code and vice versa. | | |
| **C217.3** | Analyze various combinational logic circuits | | |
| **C217.4** | To Design various sequential circuits. | | |
| **C217.5** | Design a sequence detector using FSM | | |
| **C217.6** | Design ring counter using shift register | | |

| Course Name | BASIC SIMULATION LAB (C218) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C218.1** | Analyze the generation of Various Signals and Sequences in SCILAB, including the operations on signals and sequences | | |
| **C218.2** | Evaluate the Convolution and Correlation between Signals and sequences. | | |
| **C218.3** | Verification of Linearity and Time Invariance Properties of a given Continuous/Discrete System. | | |
| **C218.4** | Analyze the Fourier Transform& Laplace Transform of a given signal and plotting its magnitude and phase spectrum | | |
| **C218.5** | Analyze Locating the Zeros and Poles and plotting the Pole-Zero maps in S-plane and Z-Plane for the given transfer function | | |
| **C218.6** | Verification of Weiner-Khin chine Relations and Sampling Theorem | | |

| Course Name | CONSTITUTION OF INDIA (C219) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C219.1** | Gain basic knowledge about the Constitution of India | | |
| **C219.2** | Understand their obligations, responsibilities, privileges and rights, duties | | |
| **C219.3** | Get insights into the administrative and judicial setup of the country. | | |
| **C219.4** | Inculcate national and patriotic spirit among the students as responsible citizens of the country | | |
| **C219.5** | Understand the importance Local Self Government – Constitutional Scheme in India | | |
| **C219.6** | Understand about Article 19 & Article 21 | | |

| Course Code | II Year II Semester Courses |
|---|---|
| C221 | LAPLACE TRANSFORMS, NUMERICAL METHODS AND COMPLEX VARIABLES |
| C222 | ELECTROMAGNETIC FIELDS AND WAVES |
| C223 | ANALOG AND DIGITAL COMMUNICATIONS |
| C224 | LINEAR IC APPLICATIONS |
| C225 | ELECTRONIC CIRCUIT ANALYSIS |
| C226 | ANALOG AND DIGITAL COMMUNICATIONS LAB |
| C227 | IC APPLICATIONS LAB |
| C228 | ELECTRONIC CIRCUIT ANALYSIS LAB |
| C229 | GENDER SENSITIZATION LAB |

| Course Name | LAPLACE TRANSFORMS, NUMERICAL METHODS AND COMPLEX VARIABLES(C221) | Regulation | R18 |
|---|---|---|---|
| Course Code | Course Outcome Statement | | |
| C221.1 | Use Laplace transforms techniques for solving ODE's | | |
| C221.2 | Find the root of a given equation | | |
| C221.3 | Estimate the value for the given data using interpolation | | |
| C221.4 | Find numerical solutions for a given ODE's | | |
| C221.5 | Analyze the complex function with reference to their analyticity and integration using Cauchy's integral and residue theorems. | | |
| C221.6 | Taylor's and Laurent's series expansions of complex Function | | |

| Course Name | ELECTROMAGNETIC FIELDS AND WAVES (C222) | Regulation | R18 |
|---|---|---|---|
| Course Code | Course Outcome Statement | | |
| C222.1 | Get the knowledge of Basic Laws, Concepts and proofs related to Electrostatic Fields and Magneto static Fields. | | |
| C222.2 | Distinguish between the static and time-varying fields; establish the corresponding sets of Maxwell's Equations and Boundary Conditions. | | |
| C222.3 | Analyze the Wave Equations for good conductors, good dielectrics and evaluate the UPW Characteristics for several practical media of interest | | |
| C222.4 | To analyze completely the rectangular waveguides, their mode characteristics, and design waveguides for solving practical problems | | |
| C222.5 | Understand the waveguides and determine the characteristics of rectangular waveguides, micro strip lines. | | |
| C222.6 | Understand the Basic Laws, Concepts and proofs related to Electrostatic Fields and Magneto static Fields, and apply them to solve physics and engineering problems | | |

| Course Name | ANALOG AND DIGITAL COMMUNICATIONS (C223) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C223.1** | Analyze and design of various continuous wave and angle modulation and demodulation techniques | | |
| **C223.2** | Analyze and design the various analog Modulation Techniques. | | |
| **C223.3** | Understand the effect of noise present in continuous wave and angle modulation techniques. | | |
| **C223.4** | Attain knowledge about AM, FM Transmitters and Receivers | | |
| **C223.5** | Analyze and design the various Pulse Modulation Techniques. | | |
| **C223.6** | Understand the concepts of Digital Modulation Techniques and Baseband transmission. | | |

| Course Name | LINEAR IC APPLICATIONS (C224) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C224.1** | A thorough understanding of operational amplifiers with linear integrated circuits | | |
| **C224.2** | Attain the knowledge of functional diagrams and applications of IC 555 and IC 565 | | |
| **C224.3** | Acquire the knowledge about Data converters. | | |
| **C224.4** | Understands the basic building blocks of linear integrated circuits. | | |
| **C224.5** | Understand the concepts of waveform generation and introduce some special function ICs. | | |
| **C224.6** | Understand the theory and applications of analog multipliers and PLL. | | |

| Course Name | ELECTRONIC CIRCUIT ANALYSIS (C225) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C225.1** | Design the multistage amplifiers and understand the concepts of High Frequency Analysis of Transistors. | | |
| **C225.2** | Utilize the Concepts of negative feedback to improve the stability of amplifiers and positive feedback to generate sustained oscillations. | | |
| **C225.3** | Design and realize different classes of Power Amplifiers and tuned amplifiers useable for audio and Radio applications. | | |
| **C225.4** | Design Multivibrators and sweep circuits for various applications. | | |
| **C225.5** | Analyze and design various types of feedback and oscillator circuits to meet specified frequency, stability, and performance requirements. | | |
| **C225.6** | Apply knowledge of multivibrators and time-base generator circuits to design and evaluate waveform generation systems for practical electronic applications. | | |

| Course Name | ANALOG AND DIGITAL COMMUNICATIONS LAB (C226) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C226.1** | Analyze the concept of Modulation and Demodulation. | | |
| **C226.2** | Design and analyze various analog modulation techniques | | |
| **C226.3** | Design the characteristics of FDM. | | |
| **C226.4** | Design and Analyze various Analog Pulse Modulation | | |
| **C226.5** | Analyze the characteristics of Digital Pulse Modulation technique. | | |
| **C226.6** | Analyze the characteristics of Digital Modulation techniques | | |

| Course Name | IC APPLICATIONS LAB (C227) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C227.1** | Design and analyze the various Linear and Nonlinear applications of Op-amp | | |
| **C227.2** | Design and analyze the filter circuits and its applications. | | |
| **C227.3** | Design and analyze the multi vibrators using op-amp | | |
| **C227.4** | Design and analyze the various applications of 555 Timer and various IC's | | |
| **C227.5** | Design PLL using IC565. | | |
| **C227.6** | Design and analyze the Voltage Regulator. | | |

| Course Name | ELECTRONIC CIRCUIT ANALYSIS LAB (C228) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C228.1** | Design the multistage amplifiers and understand the concepts of High Frequency Analysis of Transistors | | |
| **C228.2** | Design and analyze different multivibrator circuits | | |
| **C228.3** | Design and realize different classes of Power Amplifiers and tuned amplifiers useable for audio and Radio applications | | |
| **C228.4** | Design of transformers coupled various types of power amplifier circuits | | |
| **C228.5** | Design the different RC and LC oscillator circuits for various frequencies. | | |
| **C228.6** | Analyze the effects of negative feedback on amplifier circuits. | | |

| Course Name | GENDER SENSITIZATION LAB (C229) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C229.1** | Develop a better understanding of important issues related to gender in contemporary India | | |
| **C229.2** | Be sensitive to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film. | | |
| **C229.3** | Attain a fine grasp of how gender discrimination works in our society and how to counter it | | |
| **C229.4** | Acquiring insight into the gender division of labor and its relation to politics and economics | | |
| **C229.5** | Equipped to work and live together as equals. | | |
| **C229.6** | Develop a sense of appreciation of women in all walks of life. | | |

| Course Code | III Year I Semester Courses |
|---|---|
| C311 | MICROPROCESSORS AND MICROCONTROLLERS |
| C312 | DATA COMMUNICATIONS AND NETWORKS |
| C313 | CONTROL SYSTEMS |
| C314 | BUSINESS ECONOMICS AND FINANCIAL ANALYSIS |
| C315 | ELECTRONIC MEASUREMENTS AND INSTRUMENTATION (PE 1) |
| C316 | MICROPROCESSORS AND MICROCONTROLLERS LAB |
| C317 | DATA COMMUNICATIONS AND NETWORKS LAB |
| C318 | ADVANCED ENGLISH COMMUNICATION SKILLS LAB |
| C319 | INTELLECTUAL PROPERTY RIGHTS |

| Course Name | MICROPROCESSORS AND MICROCONTROLLERS (C311) | Regulation | R18 |
|---|---|---|---|
| Course Code | Course Outcome Statement | | |
| C311.1 | Understands the internal architecture, organization and assembly language programming of 8086 processors | | |
| C311.2 | Understands the internal architecture, organization and assembly language programming of 8051/controllers | | |
| C311.3 | Understands the interfacing techniques to 8086 and 8051 based systems. | | |
| C311.4 | Understands the internal architecture of ARM processors and basic concepts of advanced ARM processors | | |
| C311.5 | Understand the concepts of Advanced ARM processors | | |
| C311.6 | Understands the knowledge about interfacing techniques of bus & memory | | |

| Course Name | DATA COMMUNICATIONS AND NETWORKS (C312) | Regulation | R18 |
|---|---|---|---|
| Course Code | Course Outcome Statement | | |
| C312.1 | Know the Categories and functions of various Data communication Networks | | |
| C312.2 | Design and analyze various error detection techniques | | |
| C312.3 | Demonstrate the mechanism of routing the data in network layer | | |
| C312.4 | Know the significance of various Flow control and Congestion control Mechanisms | | |
| C312.5 | Know the significance of various Flow control and Congestion control Mechanisms | | |
| C312.6 | Analyze and evaluate complete network communication systems using networking protocals &architectures | | |

| Course Name | CONTROL SYSTEMS (C313) | Regulation | R18 |
|---|---|---|---|
| Course Code | Course Outcome Statement | | |
| C313.1 | Differentiate open and Closed loop systems and able to write some practical examples of these two systems | | |
| C313.2 | Design linear-time-invariant systems using transfer function | | |
| C313.3 | Construct Root Loci and Evaluate stability using Routh-Hurwitz Criteria | | |
| C313.4 | Understand the concept of stability and its assessment for linear-time invariant systems | | |
| C313.5 | Evaluate Gain and Phase margins from Bode, Polar and Nyquist plots | | |

| | |
|---|---|
| **C313.6** | Design simple feedback controllers |

| **Course Name** | **BUSINESS ECONOMICS AND FINANCIAL ANALYSIS (C314)** | **Regulation** | **R18** |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C314.1** | To learn the basic business types, impact of the economy on Business and Firms specifically | | |
| **C314.2** | To analyze the Business from the Financial Perspective. | | |
| **C314.3** | To understand the concepts of managerial economics and the market dynamics namely demand elasticity of demand and pricing in different market structures | | |
| **C314.4** | To gain knowledge on production theories and cost analysis while dealing with the production and the concept of breakeven analysis | | |
| **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 | | |
| **C314.6** | To describe the significance of project management, capital budgeting, estimation of the projects through capital budgeting methods for choosing the best and optimal projects | | |

| **Course Name** | **ELECTRONIC MEASUREMENTS AND INSTRUMENTATION (PE I) (C315)** | **Regulation** | **R18** |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C315.1** | Measure electrical parameters with different meters and understand the basic definition of measuring parameters | | |
| **C315.2** | Use various types of signal generators, signal analyzers for generating and analyzing various real-time signals | | |
| **C315.3** | Operate an Oscilloscope to measure various signals. | | |
| **C315.4** | Measure various physical parameters by appropriately selecting the transducers. | | |
| **C315.5** | Understand the concepts of various measuring bridges and their balancing conditions. | | |
| **C315.6** | Understand various measuring techniques for measurement of different physical parameters using different classes of transducers | | |

| **Course Name** | **MICROPROCESSORS AND MICROCONTROLLERS LAB (C316)** | **Regulation** | **R18** |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C316.1** | Analyze and apply the fundamentals of assembly level programming of microprocessors and microcontroller | | |
| **C316.2** | Explain the implementation of 8051 instruction Set | | |
| **C316.3** | Demonstrate standard microprocessor real time interfaces including serial ports, digital-to-analog converters and analog-to-digital converters. | | |
| **C316.4** | Analyze abstract problems and apply a combination of hardware and software to address the problem | | |
| **C316.5** | Identify troubleshoots interactions between software and hardware. | | |
| **C316.6** | Make use of standard test and measurement equipment to evaluate digital interfaces. | | |

| Course Name | DATA COMMUNICATIONS AND NETWORKS LAB(C317) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C317.1** | Students get a through various aspects of networking devices | | |
| **C317.2** | Students get the basics of IP addressing | | |
| **C317.3** | Students will be able to understand the basics of sliding window protocol | | |
| **C317.4** | Students get a thorough understanding of the routing protocols and implement them successfully | | |
| **C317.5** | Students can understand the use of client /server architecture in application development | | |
| **C317.6** | Students can design reliable servers using both TCP and UDP sockets. | | |

| Course Name | ADVANCED ENGLISH COMMUNICATION SKILLS LABORATORY (C318) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | Course Outcome Statement | | |
| **C318.1** | Acquire vocabulary and use it contextually | | |
| **C318.2** | Listen and speak effectively | | |
| **C318.3** | Develop proficiency in academic reading and writing | | |
| **C318.4** | Increase possibilities of job prospects | | |
| **C318.5** | Communicate confidently in formal and informal contexts | | |
| **C318.6** | Respond appropriately in different socio-cultural and professional contexts | | |

| Course Name | INTELLECTUAL PROPERTY RIGHTS (C319) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C319.1** | It allows students to prepare and protect the Inventions, start-up ideas and rights of patents and copy rights etc., | | |
| **C319.2** | Students get the knowledge on Trademarks and Trade Secrets. | | |
| **C319.3** | This subject brings awareness to the students on the various types of Unfair Competition, and the students get well versed with exposure to licensing and transfer of Copyrights and Patents | | |
| **C319.4** | Student gets. Awareness of Cyber laws and Cyber Crime, to protect the data from Cyber crime | | |
| **C319.5** | Summarize the Intellectual property rights globally and exposure to the emerging trends in IPR | | |
| **C319.6** | Students understand the Trademarks and Trade secrets. To create awareness of unfair completion and methods of it | | |

| Course Code | III Year II Semester Courses |
|---|---|
| C321 | ANTENNAS AND PROPAGATION |
| C322 | DIGITAL SIGNAL PROCESSING |
| C323 | VLSI DESIGN |
| C324 | EMBEDDED SYSTEM DESIGN (PE 2) |
| C325 | DISASTER PREPAREDNESS & PLANNING MANAGEMENT (OE I) |
| C326 | DIGITAL SIGNAL PROCESSING LAB |
| C327 | E - CAD LAB |
| C328 | SCRIPTING LANGUAGES LAB |
| C329 | ENVIRONMENTAL SCIENCE |

| Course Name | ANTENNAS AND PROPAGATION (C321) | Regulation | R18 |
|---|---|---|---|
| Course Code | Course Outcome Statement | | |
| C321.1 | Analyze antenna types, configurations, and radiation patterns. | | |
| C321.2 | Perform microwave and antenna measurement experiments. | | |
| C321.3 | Understand wave propagation mechanisms and related parameters. | | |
| C321.4 | Apply microwave setup procedures for antenna measurements. | | |
| C321.5 | Analyze and design VHF, UHF, and microwave antennas. | | |
| C321.6 | Understand radiation concepts and key antenna parameters. | | |

| Course Name | DIGITAL SIGNAL PROCESSING (C322) | Regulation | R18 |
|---|---|---|---|
| Course Code | Course Outcome Statement | | |
| C322.1 | Understand the fast computation of DFT and appreciate the FFT processing | | |
| C322.2 | Understand the LTI system characteristics and multi rate signal processing | | |
| C322.3 | Understand the inter-relationship between DFT and various transforms | | |
| C322.4 | Design and structures of digital (IIR and FIR) filters and analyze and synthesize for a given specifications | | |
| C322.5 | Design a digital filter for a given specification | | |
| C322.6 | Understand the significance of various filter structures and effects of round off errors | | |

| Course Name | VLSI DESIGN (C323) | Regulation | R18 |
|---|---|---|---|
| Course Code | Course Outcome Statement | | |
| C323.1 | Acquire qualitative knowledge about the fabrication process of integrated circuits using MOS transistors | | |
| C323.2 | Draw the layout of any logic circuit which helps to understand and estimate parasitic effect of any logic circuit | | |
| C323.3 | Design building blocks of data path systems, memory and simple logic circuits using PLA, PAL, FPGA and CPLD. | | |
| C323.4 | Design simple memories using MOS transistors and can understand design of large memories. | | |
| C323.5 | Understand basic programmable logic devices and testing of CMOS circuits | | |
| 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. | | |

| Course Name | EMBEDDED SYSTEM DESIGN (PE 2) (C324) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C324.1** | To understand the selection procedure of Processors in the embedded domain | | |
| **C324.2** | Design Procedure for Embedded Firmware | | |
| **C324.3** | To visualize the role of Real time Operating Systems in Embedded Systems. | | |
| **C324.4** | To evaluate the Correlation between task synchronization and latency issues | | |
| **C324.5** | To understand the necessity of operating systems in correlation with hardware systems | | |
| **C324.6** | To provide clear understanding of the role of firmware. | | |

| Course Name | DISASTER PREPAREDNESS & PLANNING MANAGEMENT (OE I) (C325) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C325.1** | The application of Disaster Concepts to Management | | |
| **C325.2** | Analyzing Relationship between Development and Disasters. | | |
| **C325.3** | Ability to understand Categories of Disasters and | | |
| **C325.4** | Realization of the responsibilities to society | | |
| **C325.5** | Disaster Risk Reduction | | |
| **C325.6** | Disasters, Environment and Development | | |

| Course Name | DIGITAL SIGNAL PROCESSING LAB (C326) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C326.1** | Analyze and process signals in the discrete domain | | |
| **C326.2** | Develop and experiment coding from basic mathematical operations to complex operations like DFT and FFT | | |
| **C326.3** | Visualize the amplitude and phase spectrum of the signal in frequency domain. | | |
| **C326.4** | Apply the principles of signal analysis to filtering | | |
| **C326.5** | Design IIR, and FIR filters for band pass, band stop, low pass and high pass filters | | |
| **C326.6** | Analyze the spectral parameter of window functions | | |

| Course Name | E - CAD LAB (C327) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C327.1** | Design of digital VLSI Circuits, stick diagram of circuits. | | |
| **C327.2** | Design the design rules of VLSI circuits. | | |
| **C327.3** | Analyze and simulate speed and power considerations Floor Planning and Layout techniques | | |
| **C327.4** | Be able to complete a significant VLSI design project having a set of objective criteria and design constraints | | |
| **C327.5** | Design the layout design rules for both static CMOS and dynamic clock CMOS circuit. | | |

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| **C327.6** | Develop an ability to design analog and digital CMOS circuits |

| **Course Name** | **SCRIPTING LANGUAGES LAB (C328)** | **Regulation** | **R18** |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C328.1** | Ability to understand the differences between Scripting languages and programming languages | | |
| **C328.2** | Able to gain some fluency programming in Ruby, Perl, TCL | | |
| **C328.3** | Understands the concepts of scripting languages for developing web-based projects | | |
| **C328.4** | Understand the applications of Ruby, TCL, Perl scripting languages | | |
| **C328.5** | Students will be able to write Perl programs to implement the following list of manipulating functions | | |
| **C328.6** | Students will be able to Ruby script to create a new string which is in copies | | |

| **Course Name** | **ENVIRONMENTAL SCIENCE (C329)** | **Regulation** | **R18** |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C329.1** | Understands the importance of ecological balance for sustainable development. | | |
| **C329.2** | Understands the impacts of developmental activities and mitigation measures | | |
| **C329.3** | Understands the environmental policies and regulations | | |
| **C329.4** | Understand and evaluate the global scale of environmental problems | | |
| **C329.5** | Articulate the interconnected and interdisciplinary nature of environmental studies | | |
| **C329.6** | Communicate complex environmental information to both technical and non-technical audiences | | |

| **Course Code** | **IV Year I Semester Courses** |
|---|---|
| **C411** | MICROWAVE AND OPTICAL COMMUNICATIONS |
| **C412** | DIGITAL IMAGE PROCESSING(PE-III) |
| **C413** | DATABASE MANAGEMENT SYSTEMS (PE-IV) |
| **C414** | PRINCIPAL OF ENTERPRENEURSHIP(OE-II) |
| **C415** | PROFESSIONAL PRACTICE, LAW & ETHICS |
| **C416** | MICROWAVE AND OPTICAL COMMUNICATIONS LAB |
| **C417** | INDUSTRIAL ORIENTED MINI PROJECT/ SUMMER INTERNSHIP |
| **C418** | SEMINARS |
| **C419** | PROJECT STAGE-1 |

| **Course Name** | **MICROWAVE AND OPTICAL COMMUNICATIONS (C411)** | **Regulation** | **R18** |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C411.1** | Known power generation at microwave frequencies and derive the performance characteristics | | |
| **C411.2** | Realize the need for solid state microwave sources and understand the principles of solid-state devices | | |
| **C411.3** | Distinguish between the different types of waveguide and ferrite components, and select proper components for engineering applications | | |
| **C411.4** | Understand the utility of S-parameters in microwave component design and learn the measurement procedure of various microwave parameters | | |
| **C411.5** | Impact the knowledge of scattering matrix, its formulation and utility, and | | |

| | |
|---|---|
| | establish the S-matrix for various types of microwave parameters |
| **C411.6** | Understand the mechanism of light propagation through Optical Fibres |

| **Course Name** | **DIGITAL IMAGE PROCESSING (PE III) (C412)** | **Regulation** | **R18** |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C412.1** | Explore the fundamental relations between pixels and utility of 2-D transforms into image processer | | |
| **C412.2** | Students will be able to design and structures of digital (IIR and FIR) filters and analyze and synthesize for a given specification | | |
| **C412.3** | Understand the enhancement, segmentation and restoration processes on an image | | |
| **C412.4** | Implement the various Morphological operations on an image | | |
| **C412.5** | Understand the need of compression and evaluation of basic compression algorithms | | |
| **C412.6** | Understand the Morphological operations on an image | | |

| **Course Name** | **DATABASE MANAGEMENT SYSTEMS (PE IV) (413)** | **Regulation** | **R18** |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C413.1** | Gain knowledge of the fundamentals of DBMS, including database design principles and the application of normal forms. | | |
| **C413.2** | Master the basics of SQL (Structured Query Language) for the effective retrieval, manipulation, and management of data within a relational database. | | |
| **C413.3** | Be acquainted with the basics of transaction processing and concurrency control, which are vital for maintaining data integrity in a multi-user environment. | | |
| **C413.4** | Become familiar with database storage structures and access techniques, understanding how data is physically stored and accessed efficiently. | | |
| **C413.5** | Identify the appropriate data models for relevant problems and design Entity-Relationship (ER) diagrams, subsequently converting them into relational database management systems (RDBMS). | | |
| **C413.6** | Apply normalization techniques for the development of robust application software. | | |

| **Course Name** | **PRINCIPAL OF ENTERPRENEURSHIP (OE-II) (414)** | **Regulation** | **R18** |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C414.1** | Able explain the meaning, importance, and role of entrepreneurship in economic development. | | |
| **C414.2** | Learn how to recognize and evaluate new business ideas and market needs. | | |
| **C414.3** | Gain skills like creativity, problem-solving, decision-making, and leadership. | | |
| **C414.4** | Analyze risks and apply strategies to manage them effectively. | | |
| **C414.5** | How to create a basic business plan including finance, marketing, and operations. | | |
| **C414.6** | Apply entrepreneurial concepts to start or manage a small business. | | |

| Course Name | PROFESSIONAL PRACTICE, LAW AND ETHICS (C415) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C415.1** | Understanding basic purpose of profession, professional ethics and various moral and social issues | | |
| **C415.2** | Awareness of professional rights and responsibilities of a Engineer, safety and risk benefit analysis of an Engineer | | |
| **C415.3** | Acquiring knowledge of various roles of Engineer in applying ethical principles at various professional levels | | |
| **C415.4** | Professional Ethical values and contemporary issues | | |
| **C415.5** | Excelling in competitive and challenging environment to contribute to industrial growth | | |
| **C415.6** | Understand the importance of Values and Ethics in their Personal lives and professional careers | | |

| Course Name | MICROWAVE AND OPTICAL COMMUNICATIONS LAB (C416) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C416.1** | Illustrate the characteristics of various microwave sources such as reflex klystron and Gun diode characteristics through experiments on microwave bench. | | |
| **C416.2** | Measure Scattering parameters of various microwave components using microwave bench | | |
| **C416.3** | Measure electrical parameters of various microwave components using microwave bench | | |
| **C416.4** | Understand the mechanism of light propagation through optical fibers | | |
| **C416.5** | Understand the utility of optical fiber into communications | | |
| **C416.6** | Understand and analyze the constructional parameters of optical fibers | | |

| Course Name | INDUSTRIAL ORIENTED MINI PROJECT/ SUMMER INTERNSHIP (C417) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C417.1** | Demonstrate a sound technical knowledge of their selected project topic. | | |
| **C417.2** | Identify the problem and formulate solution. | | |
| **C417.3** | Design engineering solutions to complex problems utilizing a system approach | | |
| **C417.4** | Implement the solution for engineering problem. | | |
| **C417.5** | Manage the team and project process effectively and efficiently. | | |
| **C417.6** | Communicate project outcomes effectively through technical documentation, presentations, and demonstrations. | | |

| Course Name | SEMINARS (C418) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C418.1** | Collect the information on their specialized topics. | | |
| **C418.2** | Prepare the technical report and show his understanding of the topic. | | |
| **C418.3** | Enhance technical Knowledge and public speaking capabilities. | | |
| **C418.4** | Empower presentation skills. | | |
| **C418.5** | Develop leadership and personal Development skills. | | |
| **C418.6** | Engage in constructive discussions and respond to queries effectively, demonstrating critical thinking and subject mastery. | | |

| Course Name | PROJECT STAGE-1 (C419) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C419.1** | Identify and define a suitable project problem through a comprehensive literature survey and problem-domain analysis. | | |
| **C419.2** | Formulate clear project objectives, scope, and methodology based on the selected problem. | | |
| **C419.3** | Develop an initial system/design/model using appropriate engineering concepts, tools, and technologies. | | |
| **C419.4** | Prepare preliminary results, feasibility analysis, or prototype layouts to validate the proposed approach. | | |
| **C419.5** | Demonstrate effective teamwork, ethical responsibility, and professional behavior during project planning and execution. | | |
| **C419.6** | Communicate project proposals effectively through well-structured documentation and presentations. | | |

| Course Code | IV Year II Semester Courses |
|---|---|
| **C421** | RADAR SYSTEMS (PE-V) |
| **C422** | LOW POWER VLSI DESIGN (PE-VI) |
| **C423** | NON CONVENTIONAL SOURCES OF ENERGY (OE-III) |
| **C424** | PROJECT STAGE-II |

| Course Name | RADAR SYSTEMS (PE V) (C421) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C421.1** | Understand radar fundamentals and derive radar range equations | | |
| **C421.2** | Analyze the operation of CW and FW-CW radars | | |
| **C421.3** | Understand MTI and pulse Doppler radar principles and performance | | |
| **C421.4** | Explain various radar tracking techniques and their applications | | |
| **C421.5** | Explain matched filter characteristics and radar receiver performance | | |
| **C421.6** | Apply radar concepts, tracking methods and phased array antenna principles for practical radar systems | | |

| Course Name | LOW POWER VLSI DESIGN (PE VI) (C422) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C422.1** | Analyze the fundamental concepts of Low power VLSI for circuit designing in Sub threshold region of operation | | |
| **C422.2** | Apply various low power techniques to reduce power consumption while designing VLSI Digital / Analog circuits in Near Threshold / Sub threshold / Deep sub threshold region of operations | | |
| **C422.3** | Illustrate Low Power low voltage adders using technology scaling | | |
| **C422.4** | Apply logic-level, architecture-level and system-level techniques in various designs to optimize power consumption of the VLSI circuits. | | |
| **C422.5** | Implement practical and state of the art Low Power VLSI design, suitable for real life and Industry applications. | | |
| **C422.6** | Analyze and design Low-Voltage Low-Power combinational circuits., Know the design of Low-Voltage Low-Power Memories. | | |

| Course Name | NON CONVENTIONAL SOURCES OF ENERGY (OE III) (C423) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C423.1** | Understand the need for non-conventional energy sources and their role in sustainable development. | | |
| **C423.2** | Explain the working principles of major renewable energy systems such as solar and wind energy | | |
| **C423.3** | Analyze different renewable energy technologies and compare them with conventional energy sources. | | |
| **C423.4** | Describe the design and operation of systems like biogas plants, hydro, and geothermal power plants. | | |
| **C423.5** | Evaluate the environmental, economic, and social impacts of renewable energy utilization. | | |
| **C423.6** | Apply knowledge of renewable energy sources to solve real-world energy problems and propose suitable solutions. | | |

| Course Name | PROJECT STAGE-II (C424) | Regulation | R18 |
|---|---|---|---|
| **Course Code** | **Course Outcome Statement** | | |
| **C424.1** | Perform a literature survey to review current knowledge and developments in chosen technical area | | |
| **C424.2** | Undertake detailed technical work in theoretical studies, computer simulation, hardware construction | | |
| **C424.3** | Interpret the results of the study for the application purpose | | |
| **C424.4** | Deliver a seminar on general areas of work being undertaken and specific contributions to that field | | |
| **C424.5** | Demonstrate knowledge, skills and attitude of a professional engineer | | |
| **C424.6** | Effectively communicate by making an oral presentation to present the project completed | | |

**Coordinator** **Head of the Department**