COs of all Courses for R23 – Regulation Curriculum

Course Name	Communicative English	Regulation	R23

CO	Statements
C111.1	Practicing indirect speech and voice changes
C111.2	Analyzing verbal techniques (linkers, sequencing)
C111.3	Grammar use (tenses, subject-verb agreement)
C111.4	Practicing indirect speech and voice changes
C111.5	Editing texts for grammar and usage

Course Name	ENGINEERING CHEMISTRY	Regulation	R23

CO	Statements
C112.1	Apply water treatment methods to improve industrial and domestic water quality
C112.2	Analyze electrochemical systems and corrosion protection strategies
C112.3	Evaluate polymers and fuels for industrial suitability and performance
C112.4	Analyze material properties and recommend appropriate applications
C112.5	Apply nanotech synthesis methods and interpret their practical applications

Course Name	LINEAR ALGEBRA & CALCULUS	Regulation	R23

CO	Statements
C113.1	Students are applying procedures to solve linear algebraic systems.
C113.2	Requires interpreting matrix structure and transformations; students analyze patterns and relationships.
C113.3	Students apply standard theorems to understand and solve functions in context.
C113.4	Involves comparing variables, optimizing, and making judgments about variable dependence.
C113.5	Involves direct application of integration techniques in geometry.

Course Name	BASIC CIVIL AND MECHANICAL ENGINEERING	Regulation	R23

CO	Statements
C114.1	Students apply knowledge of civil engineering domains and evaluate basic material choices in construction scenarios.
C114.2	Involves applying techniques and solving practical problems related to land surveying and mapping.
C114.3	Students describe infrastructure components and understand their applications in real-life civil projects.
C114.4	Illustrate the basic thermodynamic cycles (Otto, Diesel, refrigeration) and explain the working principles of boilers and internal combustion engines.
C114.5	Describe the sources, quality, and conservation techniques of water, and understand the basics of environmental engineering.

Course Name	INTRODUCTION TO PROGRAMMING	Regulation	R23

CO	Statements
C115.1	Understand the basic organization of a computer, history of computers, and fundamental programming concepts including algorithms, flowcharts, and pseudo code.
C115.2	Apply control structures such as conditional statements and loops to write simple sequential programs.
C115.3	Use arrays and strings for data storage and manipulation, understanding their memory representation and indexing.
C115.4	Explain pointers, pointer arithmetic, and user-defined data types such as structures and unions for efficient memory management.
C115.5	Develop modular programs using functions, handle scope and lifetime of variables, and perform basic file operations for persistent data storage.

Course Name	COMMUNICATIVE ENGLISH LAB	Regulation	R23

CO	Statements
C116.1	Demonstrate correct pronunciation of English vowels and consonants with proper stress, intonation, and accent through guided practice.
C116.2	Employ communication techniques such as JAM, role-play, and conversational practices to enhance fluency and interpersonal skills.
C116.3	Compose formal email communication, resumes, cover letters, and statements of purpose using appropriate structure, tone, and language.
C116.4	Participate actively and effectively in group discussions and debates using strategies such as logical reasoning, argumentation, and persuasion.
C116.5	Present technical and non-technical content through posters or PowerPoint presentations, and demonstrate essential interview skills in simulated scenarios.

Course Name	ENGINEERING CHEMISTRY LAB	Regulation	R23

CO	Statements
C117.1	Analyze water quality by determining hardness and dissolved oxygen content using standard methods, highlighting environmental monitoring skills.
C117.2	Estimate acid strength in Pb-Acid batteries and quantify iron and calcium content in cement samples using titrimetric and colorimetric techniques relevant to industrial applications.
C117.3	Demonstrate synthesis of polymers and nanomaterials through practical preparation methods, understanding their material properties and applications.
C117.4	Evaluate adsorption characteristics of acetic acid on charcoal and determine moisture content in coal samples, emphasizing surface chemistry and fuel quality analysis.
C117.5	Determine physical properties such as viscosity of lubricating oils and calorific value of gases, essential for assessing fuel efficiency and lubrication performance.

Course Name	ENGINEERING WORKSHOP	Regulation	R23

CO	Statements
C118.1	Demonstrate safety practices and proper use of hand tools across various workshop trades.
C118.2	Perform basic carpentry operations such as cutting, planning, and making joints like half-lap, mortise and tenon, and dovetail.
C118.3	Develop simple sheet metal components such as tapered trays, funnels, and pipe fittings using appropriate tools and techniques.
C118.4	Make accurate fitting and plumbing joints, and perform basic maintenance tasks such as tire replacement and puncture repair.
C118.5	Construct basic electrical wiring circuits and perform basic welding, foundry, and two-wheeler repair operations.

Course Name	COMPUTER PROGRAMMING LAB	Regulation	R23

CO	Statements
C119.1	Demonstrate knowledge of C programming concepts including data types, operators, and syntax.
C119.2	Develop flowcharts and write algorithms for simple to moderate programming problems.
C119.3	Design and develop C programs using structured problem-solving techniques.
C119.4	Apply modular programming techniques using functions and arrays.
C119.5	Trace, test, and debug C programs to ensure correctness and efficiency.

Course Name	NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE	Regulation	R23

CO	Statements
C1110.1	Understand the importance of discipline, character and service motto.
C1110.2	Solve some societal issues by applying acquired knowledge, facts, and techniques.
C1110.3	Explore human relationships by analyzing social problems.
C1110.4	Determine to extend their help for the fellow beings and downtrodden people.
C1110.5	Develop leadership skills and civic responsibilities

Course Name	Engineering Physics	Regulation	R23

CO	Statements
C121.1	Analyze the intensity variation of light due to polarization, interference, and diffraction.
C121.2	Familiarize with the basics of crystals and their structures.
C121.3	Explain fundamentals of quantum mechanics and apply it to one-dimensional motion of particles.
C121.4	Summarize various types of polarization of dielectrics and classify the magnetic materials.
C121.5	Identify the type of semiconductor using Hall effect.

Course Name	DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS	Regulation	R23

CO	Statements
C122.1	Analyze the intensity variation of light due to polarization, interference, and diffraction.
C122.2	Identify solution methods for partial differential equations that model physical processes.
C122.3	Interpret the physical meaning of different operators such as gradient, curl, and divergence.
C122.4	Estimate the work done against a field, circulation, and flux using vector calculus techniques.
C122.5	Apply the concepts of quantum mechanics and band theory to explain the behavior of solids and semiconductors.

Course Name	Basic Electrical and Electronics Engineering	Regulation	R23

CO	Statements
C123.1	Describe the fundamental principles of electrical circuits, machines, and measuring instruments.
C123.2	Demonstrate the construction and working of DC machines, transformers, and measuring devices.
C123.3	Apply basic circuit laws and theorems to analyze AC and DC electrical circuits.
C123.4	Analyze performance parameters of electrical machines through relevant equations and characteristics.
C123.5	Calculate power consumption and electricity bills for residential and commercial installations.

Course Name	ENGINEERING GRAPHICS	Regulation	R23

CO	Statements
C124.1	Describe the fundamental concepts of engineering drawing including curves, scales, and projection methods.
C124.2	Construct orthographic projections of points, lines, planes, and solids from different viewpoints.
C124.3	Apply projection techniques to visualize and draw solids in various positions within the first quadrant.
C124.4	Illustrate the development of surfaces for different solids based on geometric principles.
C124.5	Create isometric and perspective views of simple objects using appropriate drawing conventions.

Course Name	IT WORKSHOP	Regulation	R23

CO	Statements

C125.1	Perform basic hardware troubleshooting and diagnose common system faults.
C125.2	Understand the functions and interdependencies of computer hardware components.
C125.3	Implement practices to safeguard computer systems from malware, viruses, and worms.
C125.4	Prepare structured documents and presentations using office tools.
C125.5	Use spreadsheet tools to perform basic data entry, formatting, and arithmetic calculations.

Course Name	**DATA STRUCTURES**	**Regulation**	**R23**

CO	Statements
C126.1	Explain the role of linear data structures in organizing and accessing data efficiently in various algorithms.
C126.2	Design and implement linked lists for dynamic memory allocation and efficient data manipulation.
C126.3	Develop programs using stacks to handle recursion, expression evaluation, and program state management.
C126.4	Apply queue structures for scheduling problems, traversal in graphs, and analyze use cases for deques and priority queues.
C126.5	Design and evaluate hash-based solutions for efficient data access and solving real-world data management problems.

Course Name	**ENGINEERING PHYSICS LAB**	**Regulation**	**R23**

CO	Statements
C127.1	Apply optical instruments such as travelling microscope and spectrometer for precise measurements.
C127.2	Analyze diffraction patterns to estimate the wavelengths of different colors using diffraction grating.
C127.3	Apply experimental methods to plot the intensity of the magnetic field of a circular coil carrying current with distance.
C127.4	Evaluate dielectric constant and magnetic susceptibility of dielectric and magnetic materials respectively.
C127.5	Analyze and evaluate semiconductor properties by calculating the band gap and identifying the type of semiconductor using Hall effect.

Course Name	**ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP**	**Regulation**	**R23**

CO	Statements
C128.1	Measure voltage, current, and power in an electrical circuit.
C128.2	Measure resistance using Wheatstone bridge.
C128.3	Discover critical field resistance and critical speed of DC shunt generators.

C128.4	Investigate the effect of reactive power and power factor in electrical loads.
C128.5	Calculate efficiency and performance parameters of electrical machines.

Course Name	DATA STRUCTURES LAB	Regulation	R23

CO	Statements
C129.1	Explain the importance of linear data structures in organizing and efficiently accessing data within algorithms.
C129.2	Design, implement, and apply linked lists for dynamic data storage, demonstrating effective memory management.
C129.3	Develop programs using stacks to manage recursive algorithms, control program states, and solve related problems.
C129.4	Apply queue-based algorithms for efficient task scheduling and breadth-first traversal; differentiate and utilize deques and priority queues appropriately.
C129.5	Identify scenarios where hashing improves performance and design hash-based solutions to solve specific problems.

Course Name	NSS/NCC/Scouts & Guides/Community Service	Regulation	R23

CO	Statements
C1210.1	Understand the importance of discipline, character, and service motto.
C1210.2	Apply acquired knowledge, facts, and techniques to solve societal issues.
C1210.3	Analyze human relationships by exploring social problems.
C1210.4	Demonstrate determination to help fellow beings and downtrodden people.
C1210.5	Develop leadership skills and civic responsibilities.

Course Name	Discrete Mathematics & Graph Theory	Regulation	R23

CO	Statements
C211.1	Build skills in solving mathematical problems
C211.2	Comprehend mathematical principles and logic
C211.3	Demonstrate knowledge of mathematical modeling and proficiency in using mathematical software
C211.4	Manipulate and analyze data numerically and/or graphicallysing appropriate Software
C211.5	How to communicate effectively mathematical ideas/results verbally or in writing

Course Name	UNIVERSAL HUMAN VALUES	Regulation	R23

CO	Statements
C212.1	Define the terms like Natural Acceptance, Happiness and Prosperity
C212.2	Identify one's self, and one's surroundings
C212.3	Apply what they have learnt to their own self in different day-to-day settings inreal life
C212.4	Relate human values with human relationship and human society
C212.5	Justify the need for universal human values and harmonious existence

Course Name	DIGITAL LOGIC & COMPUTER ORGANIZATION	Regulation	R23

CO	Statements
C213.1	Understand data representation methods and basic digital logic circuits.
C213.2	Apply concepts of sequential circuits and analyze basic computer architecture.
C213.3	Analyze arithmetic operations and processor organization techniques.
C213.4	Examine memory hierarchy, organization, and performance optimization.
C213.5	Analyze I/O system concepts including DMA and standard interface techniques.

Course Name	DIGITAL LOGIC & COMPUTER ORGANIZATION	Regulation	R23

CO	Statements
C214.1	Analyze algorithm complexity and apply AVL and B-Tree operations.
C214.2	Apply and analyze heap and graph algorithms with real-world applications.
C214.3	Apply divide and conquer, greedy, and dynamic programming techniques.
C214.4	Analyze and implement backtracking and branch and bound strategies.
C214.5	Understand NP-Hard and NP-Complete problems with examples.

Course Name	OBJECT ORIENTED PROGRAMMING THROUGH JAVA	Regulation	R23

CO	Statements

C215.1	Understand basic OOP concepts, Java syntax, and control structures.
C215.2	Apply classes, objects, and methods to build Java applications.
C215.3	Apply arrays, inheritance, and interfaces for object-oriented program design.
C215.4	Analyze exception handling, packages, and file I/O in Java.
C215.5	Develop Java programs using multithreading, string handling, and JDBC.

Course Name	**ADVANCED DATA STRUCTURES & ALGORITHM ANALYSIS LAB**	**Regulation**	**R23**

CO	Statements
C216.1	Construct and manipulate AVL and B-Trees with insertion, deletion, and traversal operations.
C216.2	Implement and analyze graph traversal techniques and related algorithms.
C216.3	Apply and evaluate sorting algorithms for different input cases.
C216.4	Develop solutions for optimization problems using Greedy and Dynamic Programming approaches.
C216.5	Implement backtracking and branch-and-bound techniques to solve complex problems.

Course Name	**OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB**	**Regulation**	**R23**

CO	Statements
C217.1	Understand and implement basic Java syntax, control structures, arrays, and strings.
C217.2	Apply object-oriented programming concepts such as classes, inheritance, interfaces, and polymorphism.
C217.3	Develop Java programs using exception handling, multithreading, and inter-thread communication.
C217.4	Design and build GUI applications using JavaFX and create user-defined packages.
C217.5	Implement database connectivity using JDBC for data insertion, deletion, and retrieval.

Course Name	**PYTHON PROGRAMMING LAB**	**Regulation**	**R23**

CO	Statements
C218.1	Apply Python fundamentals to solve basic programming problems.
C218.2	Develop modular programs using functions, strings, and lists
C218.3	Construct programs using dictionaries, tuples, and sets for data handling.
C218.4	Implement file operations and object-oriented programming concepts.
C218.5	Analyze and manipulate data using NumPy, Pandas, and visualization tools

Course Name	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	Regulation	R23

CO	Statements
C221.1	Define the concepts related to Managerial Economics, financial accounting and management
C221.2	Understand the fundament also fEconomicsviz., Demand, Production, cost, revenueand markets
C221.3	Apply the Concept of Production costand revenues for effective Business decision
C221.4	Analyze how to invest their capital and maximize returns
C221.5	Evaluate the capital budgeting techniques

Course Name	PROBABILITY AND STATISTICS	Regulation	R23

CO	Statements
C222.1	Classify the concepts of data science and its importance
C222.2	Interpret the association of characteristics and through correlation and regression tools
C222.3	Apply discrete and continuous probability distributions
C222.4	Design the components of a classical hypothesis test
C222.5	Infer the statistical inferential methods based on small and large sampling tests

Course Name	OPERATING SYSTEMS	Regulation	R23

CO	Statements
C223.1	Understand the structure, functions, and services of modern operating systems.
C223.2	Analyze and apply concepts of process management and CPU scheduling.
C223.3	Apply synchronization techniques and evaluate deadlock handling methods.
C223.4	Explain and compare memory management strategies and virtual memory concepts.
C223.5	Describe file system architecture and implement file system operations.

Course Name	DATABASE MANAGEMENT SYSTEMS	Regulation	R23

CO	Statements
C224.1	Explain fundamental concepts of database systems, data models, and architecture.

C224.2	Apply relational model concepts and perform basic SQL operations on database tables.
C224.3	Construct complex SQL queries involving joins, nested queries, and aggregation functions.
C224.4	Analyze and normalize database schemas using functional dependencies and normal forms.
C224.5	Evaluate transaction management techniques and implement indexing methods for efficient data retrieval.

Course Name	**SOFTWARE ENGINEERING**	**Regulation**	**R23**

CO	Statements
C225.1	Describe the evolution of software engineering and various software development life cycle models.
C225.2	Apply project management techniques including estimation, risk management, and requirements specification.
C225.3	Analyze software design principles, agile methodologies, and user interface design concepts.
C225.4	Evaluate different testing strategies, software reliability, and quality management standards.
C225.5	Illustrate the role of CASE tools, software maintenance processes, and software reuse strategies.

Course Name	**OPERATING SYSTEMS LAB**	**Regulation**	**R23**

CO	Statements
C226.1	Practice basic UNIX commands and demonstrate the usage of essential system calls.
C226.2	Simulate and analyze various CPU scheduling and memory allocation techniques.
C226.3	Develop programs to solve classic synchronization problems using semaphores, monitors, and threads.
C226.4	Implement file and page management techniques including file allocation and page replacement algorithms.
C226.5	Demonstrate the working of OS-level concepts through NachOS and simulate advanced OS functionalities.

Course Name	**DATABASE MANAGEMENT SYSTEMS LAB**	**Regulation**	**R23**

CO	Statements
C227.1	Apply SQL commands to create, manipulate, and query relational databases using various constraints and clauses.
C227.2	Develop PL/SQL programs using control structures, exception handling, procedures, and functions.

C227.3	Implement cursors and triggers to manage complex operations and automate database tasks.
C227.4	Demonstrate the use of indexing and optimization techniques for efficient data retrieval.
C227.5	Connect databases with Java using JDBC for performing CRUD operations programmatically.

Course Name	**FULL STACK DEVELOPMENT – 1**	**Regulation**	**R23**

CO	Statements
C228.1	Design web pages using HTML elements like lists, tables, forms, and frames.
C228.2	Apply CSS to style web pages using selectors, color, font, and box model properties.
C228.3	Develop dynamic web pages using JavaScript for input/output, control structures, and loops.
C228.4	Implement JavaScript objects, events, and user-defined functions to build interactive features
C228.5	Validate form inputs using JavaScript and regular expressions.

Head of the Department