B.E., Computer Science Engineering

S.No	Courses	Course Outcomes	Blooms Taxonomy Level
	HS3152: Professional English - I	**CO1:** To use appropriate words in a professional context	K3
		CO2: To gain understanding of basic grammatic structures and use them in right context.	K2
		CO3: To read and infer the denotative and connotative meanings of technical texts	K1
		CO4: To write definitions, descriptions, narrations and essays on various topics	K6
	MA3151: Matrices and Calculus	**CO1:** Use the matrix algebra methods for solving practical problems.	K3
		CO2: Apply differential calculus tools in solving various application problems.	K3
		CO3: Able to use differential calculus ideas on several variable functions.	K3
		CO4: Apply different methods of integration in solving practical problems.	K3
		CO5: Apply multiple integral ideas in solving areas, volumes and other practical problems.	K3
	PH3151: Engineering Physics	**CO1:** Understand the importance of mechanics.	K2
		CO2: Express their knowledge in electromagnetic waves.	K1
		CO3: Demonstrate a strong foundational knowledge in oscillations, optics and lasers.	K3
		CO4: Understand the importance of quantum physics.	K2
		CO5: Comprehend and apply quantum mechanical principles towards the formation of energy bands.	K3
S E M I	CY3151: Engineering Chemistry	**CO1:** To infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water.	K2
		CO2: To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.	K1
		CO3: To apply the knowledge of phase rule and composites for material selection requirements.	K3
		CO4: To recommend suitable fuels for engineering processes and applications.	K5
		CO5: To recognize different forms of energy resources and apply them for suitable applications in energy sectors.	K1

	GE3151: Problem Solving and Python Programming	**CO1:** Develop algorithmic solutions to simple computational problems.	K6
		CO2: Develop and execute simple Python programs.	K6
		CO3: Write simple Python programs using conditionals and loops for solving problems.	K6
		CO4: Decompose a Python program into functions.	K4
		CO5: Represent compound data using Python lists, tuples, dictionaries etc.	K3
		CO6: Read and write data from/to files in Python programs.	K1
SEM I	**GE3171: Problem Solving and Python Programming Laboratory**	**CO1:** Develop algorithmic solutions to simple computational problems	K6
		CO2: Develop and execute simple Python programs.	K6
		CO3: Implement programs in Python using conditionals and loops for solving problems.	K3
		CO4: Deploy functions to decompose a Python program.	K6
		CO5: Process compound data using Python data structures.	K3
		CO6: Utilize Python packages in developing software applications.	K3
	BS3171: Physics and Chemistry Laboratory	**CO1:** Understand the functioning of various physics laboratory equipment.	K2
		CO2: Use graphical models to analyze laboratory data.	K3
		CO3: Use mathematical models as a medium for quantitative reasoning and describing physical reality.	K3
		CO4: Access, process and analyze scientific information.	K3
	GE3172: English Laboratory	**CO1:** To listen to and comprehend general as well as complex academic information	K3
		CO2: To listen to and understand different points of view in a discussion	K2
		CO3: To speak fluently and accurately in formal and informal communicative contexts	K6
		CO4: To describe products and processes and explain their uses and purposes clearly and accurately	K1
		CO5: To express their opinions effectively in both formal and informal discussions	K1
SEM II		**CO1:** To compare and contrast products and ideas in technical texts.	K2
		CO2: To identify and report cause and effects in events, industrial processes through technical texts	K1

	HS3252 : Professional English - II	**CO3:** To analyse problems in order to arrive at feasible solutions and communicate them in the written format.	K4
		CO4: To present their ideas and opinions in a planned and logical manner	K3
		CO5: To draft effective resumes in the context of job search.	K6
	MA3251 : Statistics and Numerical Methods	**CO1:** Apply the concept of testing of hypothesis for small and large samples in real life problems.	K3
		CO2: Apply the basic concepts of classifications of design of experiments in the field of agriculture.	K3
		CO3: Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.	K5
		CO4: Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.	K2
		CO5: Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.	K3
	PH3256 : Physics for Information Science	**CO1:** Gain knowledge on classical and quantum electron theories, and energy band structures.	K2
		CO2: Acquire knowledge on basics of semiconductor physics and its applications in various devices	K1
		CO3: Get knowledge on magnetic properties of materials and their applications in data storage,	K1
		CO4: Have the necessary understanding on the functioning of optical materials for optoelectronics	K2
		CO5: Understand the basics of quantum structures and their applications and basics of quantum computing	K2
	BE3251: Basic Electrical and Electronics Engineering	**CO1:** Compute the electric circuit parameters for simple problems	K2
		CO2: Explain the working principle and applications of electrical machines	K1
SEM II		**CO3:** Analyze the characteristics of analog electronic devices	K4
		CO4: Explain the basic concepts of digital electronics	K1
		CO5: Explain the operating principles of measuring instruments	K1
	GE3251: Engineering Graphics	**CO1:** Use BIS conventions and specifications for engineering drawing.	K3
		CO2: Construct the conic curves, involutes and cycloid.	K6
		CO3: Solve practical problems involving projection of lines.	K3

		CO4: Draw the orthographic, isometric and perspective projections of simple solids.	K6
		CO5: Draw the development of simple solids.	K6
	CS3251: Programming in C	**CO1:** Demonstrate knowledge on C Programming constructs	K3
		CO2: Develop simple applications in C using basic constructs	K6
		CO3: Design and implement applications using arrays and strings	K6
		CO4: Develop and implement modular applications in C using functions.	K6
		CO5: Develop applications in C using structures and pointers.	K6
		CO6: Design applications using sequential and random access file processing.	K6
	GE3271 : Engineering Practices Laboratory	CO1:Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work.	K6
		CO2:Wire various electrical joints in common household electrical wire work.	K6
		CO3:Weld various joints in steel plates using arc welding work; Machine various simple processes	K6
		CO4:Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB..	K6
	CS3271 : Programming in C Laboratory	**CO1:** Demonstrate knowledge on C programming constructs.	K3
		CO2: Develop programs in C using basic constructs.	K6
		CO3: Develop programs in C using arrays.	K6
		CO4: Develop applications in C using strings, pointers, functions.	K6
		CO5: Develop applications in C using structures.	K6
		CO6: Develop applications in C using file processing.	K6
	GE3272 : Communication Laboratory / Foreign Language	**CO1:** Have knowledge of the concepts needed to test the logic of a program.	K1
		CO2: Have an understanding in identifying structures on many levels.	K2
		CO3: Be aware of a class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.	K2

		CO4: Be exposed to concepts and properties of algebraic structures such as groups, rings and fields.	K2
S E M III	**MA3354 : Discrete Mathematics**	**CO1:** Have knowledge of the concepts needed to test the logic of a program.	K1
		CO2: Have an understanding in identifying structures on many levels.	K2
		CO3: Be aware of a class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.	K2
		CO4: Be aware of the counting principles.	K2
		CO5: Be exposed to concepts and properties of algebraic structures such as groups, rings and fields.	K2
	CS3351: Digital Principles And Computer Organization	**CO1:** Design various combinational digital circuits using logic gates	K6
		CO2: Design sequential circuits and analyze the design procedures	K6
		CO3: State the fundamentals of computer systems and analyze the execution of an instruction	K1
		CO4: Analyze different types of control design and identify hazards	K4
		CO5: Identify the characteristics of various memory systems and I/O communication	K1
	CS3352 Foundations of Data Science	**CO1:** Define the data science process	K1
		CO2: Understand different types of data description for data science process	K2
		CO3: Gain knowledge on relationships between data	K2
		CO4: Use the Python Libraries for Data Wrangling	K3
		CO5: Apply visualization Libraries in Python to interpret and explore data	K3
	CS3301 Data Structures	**CO1:** Define linear and non-linear data structures.	K1
		CO2: Implement linear and non–linear data structure operations.	K3
		CO3: Use appropriate linear/non–linear data structure operations for solving a given problem.	K3
		CO4: Apply appropriate graph algorithms for graph applications.	K3
		CO5: Analyze the various searching and sorting algorithms.	K4
	CS3391 Object	**CO1:** Apply the concepts of classes and objects to solve simple problems	K3
		CO2: Develop programs using inheritance, packages and interfaces	K6

	Oriented Programming	**CO3:** Make use of exception handling mechanisms and multithreaded model to solve real world problems	K3
		CO4: Build Java applications with I/O packages, string classes, Collections and generics concepts	K5
		CO5: Integrate the concepts of event handling and JavaFX components and controls for developing GUI based applications	K5
	CS3311 Data Structures Laboratory	**CO1:** Implement Linear data structure algorithms.	K3
		CO2: Implement applications using Stacks and Linked lists	K3
		CO3: Implement Binary Search tree and AVL tree operations.	K3
		CO4: Implement graph algorithms.	K3
		CO5: Analyze the various searching and sorting algorithms.	K4
	CS3381 Object Oriented Programming Laboratory	**CO1:** Design and develop java programs using object oriented programming concepts	K6
		CO2: Develop simple applications using object oriented concepts such as package, exceptions	K6
		CO3: Implement multithreading, and generics concepts	K3
		CO4: Create GUIs and event driven programming applications for real world problems	K6
		CO5: Implement and deploy web applications using Java	K3
	CS3361 Data Science Laboratory	**CO1:** Make use of the python libraries for data science	K3
		CO2: Make use of the basic Statistical and Probability measures for data science.	K3
		CO3: Perform descriptive analytics on the benchmark data sets.	K3
		CO4: Perform correlation and regression analytics on standard data sets	K3
		CO5: Present and interpret data using visualization packages in Python.	K3
	GE3361 Professional Development	**CO1:** Use MS Word to create quality documents, by structuring and organizing content for their day to day technical and academic requirements	K3
		CO2: Use MS EXCEL to perform data operations and analytics, record, retrieve data as per requirements and visualize data for ease of understanding	K3
		CO3: Use MS PowerPoint to create high quality academic presentations by including common tables, charts, graphs, interlinking other elements, and using media objects.	K3

SEM IV	**CS3452 : Theory of Computation**	**CO1:** Construct automata theory using Finite Automata	K6
		CO2: Write regular expressions for any pattern	K6
		CO3: Design context free grammar and Pushdown Automata	K6
		CO4: Design Turing machine for computational functions	K6
		CO5: Differentiate between decidable and undecidable problems	K4
	CS3491: Artificial Intelligence and Machine Learning	**CO1:** Use appropriate search algorithms for problem solving	K3
		CO2: Apply reasoning under uncertainty	K3
		CO3: Build supervised learning models	K6
		CO4: Build ensembling and unsupervised models	K6
		CO5: Build deep learning neural network models	K6
	CS3492 : Database Management Systems	**CO1:** Construct SQL Queries using relational algebra	K6
		CO2: Design database using ER model and normalize the database	K6
		CO3: Construct queries to handle transaction processing and maintain consistency of the database	K6
		CO4: Compare and contrast various indexing strategies and apply the knowledge to tune the performance of the database	K2
		CO5: Appraise how advanced databases differ from Relational Databases and find a suitable database for the given requirement.	K5
SEM IV	**CS3401: Algorithms**	**CO1:** Analyze the efficiency of algorithms using various frameworks	K4
		CO2: Apply graph algorithms to solve problems and analyze their efficiency.	K3
		CO3: Make use of algorithm design techniques like divide and conquer, dynamic programming and greedy techniques to solve problems	K3
		CO4: Use the state space tree method for solving problems.	K3
		CO5: Solve problems using approximation algorithms and randomized algorithms	K3
	CS3451 : Introduction to Operating System	**CO1:** Analyze various scheduling algorithms and process synchronization.	K4
		CO2: Explain deadlock prevention and avoidance algorithms.	K1
		CO3: Compare and contrast various memory management schemes.	K2
		CO4: Explain the functionality of file systems, I/O systems, and Virtualization	K1
		CO5: Compare iOS and Android Operating Systems.	K2

	GE3451: Environmental Sciences and Sustainability	CO1:To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation.	K2
		CO2:To identify the causes, effects of environmental pollution and natural disasters and contribute to the preventive measures in the society.	K1
		CO3:To identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.	K1
		CO4:To recognize the different goals of sustainable development and apply them for suitable technological advancement and societal development.	K1
		CO5:To demonstrate the knowledge of sustainability practices and identify green materials, energy cycles and the role of sustainable urbanization.	K3
	CS3461: Operating Systems Laboratory	**CO1:** Define and implement UNIX Commands.	K1
		CO2: Compare the performance of various CPU Scheduling Algorithms.	K2
		CO3: Compare and contrast various Memory Allocation Methods.	K2
		CO4: Define File Organization and File Allocation Strategies.	K1
		CO5: Implement various Disk Scheduling Algorithms.	K3
	CS3481: Database Management Systems Laboratory	**CO1:** Create databases with different types of key constraints.	K6
		CO2: Construct simple and complex SQL queries using DML and DCL commands.	K6
		CO3: Use advanced features such as stored procedures and triggers and incorporate in GUI based application development.	K3
		CO4: Create an XML database and validate with meta-data (XML schema).	K6
		CO5: Create and manipulate data using NOSQL database.	K6
S E M V	**CS3591: Computer Networks**	**CO1:** Explain the basic layers and its functions in computer networks.	K1
		CO2: Understand the basics of how data flows from one node to another.	K2
		CO3: Analyze routing algorithms.	K4
		CO4: Describe protocols for various functions in the network.	K1
		CO5: Analyze the working of various application layer protocols.	K4
		CO1: Understand the techniques in different phases of a compiler.	K2

	CS3501: COMPILER DESIGN	**CO2:** Design a lexical analyser for a sample language and learn to use the LEX tool.	K6
		CO3: Apply different parsing algorithms to develop a parser and learn to use YACC tool	K3
		CO4: Understand semantics rules (SDT), intermediate code generation and run-time environment.	K2
		CO5: Implement code generation and apply code optimization techniques.	K3
	CB3491: CRYPTOGRAPHY AND CYBER SECURITY	**CO1:** Understand the fundamentals of networks security, security architecture, threats and vulnerabilities	K2
		CO2: Apply the different cryptographic operations of symmetric cryptographic algorithms	K3
		CO3: Apply the different cryptographic operations of public key cryptography	K3
		CO4: Apply the various Authentication schemes to simulate different applications.	K3
		CO5: Understand various cyber crimes and cyber security.	K2
	CS3551: Distributed computing	**CO1:** Explain the foundations of distributed systems (K2)	K1
		CO2: Solve synchronization and state consistency problems (K3)	K3
		CO3: Use resource sharing techniques in distributed systems (K3)	K3
		CO4: Apply working model of consensus and reliability of distributed systems (K3)	K3
		CO5: Explain the fundamentals of cloud computing (K2)	K1
	CCS375: WEB TECHNOLOGIES	**CO1:** Construct a basic website using HTML and Cascading Style Sheets	K6
		CO2: Build dynamic web page with validation using Java Script objects and by applying different event handling mechanisms.	K6
		CO3: Develop server side programs using Servlets and JSP.	K6
		CO4: Construct simple web pages in PHP and to represent data in XML format.	K6
		CO5: Develop interactive web applications.	K6
	CCS334: BIG DATA ANALYTICS	**CO1:** Describe big data and use cases from selected business domains.	K1
		CO2: Explain NoSQL big data management.	K1
		CO3: Install, configure, and run Hadoop and HDFS.	K4
		CO4: Perform map-reduce analytics using Hadoop.	K4
		CO5: Use Hadoop-related tools such as HBase, Cassandra, Pig, and Hive for big data analytics.	K3

SEM VI	CCS341: DATA WAREHOUSING	**CO1:** Design data warehouse architecture for various Problems	K6
		CO2: Apply the OLAP Technology	K3
		CO3: Analyse the partitioning strategy	K4
		CO4: Critically analyze the differentiation of various schema for given problem	K4
		CO5: Frame roles of process manager & system manager	K6
	CS3691: EMBEDDED SYSTEM AND IOT	**CO1:** Explain the architecture of embedded processors.	K1
		CO2: Write embedded C programs.	K6
		CO3: Design simple embedded applications.	K6
		CO4: Compare the communication models in IOT	K2
		CO5: Design IoT applications using Arduino/Raspberry Pi /open platform.	K6
	CCS356: OBJECT ORIENTED SOFTWARE ENGINEERING	**CO1:** Compare various Software Development Lifecycle Models	K2
		CO2: Evaluate project management approaches as well as cost and schedule estimation strategies	K5
		CO3: Perform formal analysis on specifications.	K4
		CO4: Use UML diagrams for analysis and design.	K3
		CO5: Architect and design using architectural styles and design patterns, and test the system	K6
	CCS343: DIGITAL AND MOBILE FORENSICS	**CO1:** Have knowledge on digital forensics.	K1
		CO2: Know about digital crime and investigations.	K1
		CO3: Be forensic ready.	K4
		CO4: Investigate, identify and extract digital evidence from iOS devices.	K1
		CO5: Investigate, identify and extract digital evidence from Android devices.	K1
	CCW332: DIGITAL MARKETING	**CO1:** To examine and explore the role and importance of digital marketing in today's rapidly changing business environment.	K4
		CO2: To focuses on how digital marketing can be utilized by organizations and how its effectiveness can be measured.	K3
		CO3: To know the key elements of a digital marketing strategy.	K1
		CO4: To study how the effectiveness of a digital marketing campaign can be measured	K1
		CO5: To demonstrate advanced practical skills in common digital marketing tools such as SEO, SEM, Social media and Blogs.	K3
	OEE351: RENEWABLE ENERGY SYSTEM	**CO1:** Attained knowledge about various renewable energy technologies	K1
		CO2: Ability to understand and design a PV system.	K2
		CO3: Understand the concept of various wind energy system.	K2
		CO4: Gained knowledge about various possible hybrid energy systems	K2

		CO5: Attained knowledge about various application of renewable energy technologies	K1
VII SEM	**GE3791: HUMAN VALUES AND ETHICS**	**CO1:** Identify the importance of democratic, secular and scientific values in harmonious functioning of social life	K1
		CO2: Practice democratic and scientific values in both their personal and professional life.	K4
		CO3: Find rational solutions to social problems.	K1
		CO4: Behave in an ethical manner in society	K2
		CO5: Practice critical thinking and the pursuit of truth.	K3
	AI3021: IT IN AGRICULTURAL SYSTEM	**CO1:** The students shall be able to understand the applications of IT in remote sensing applications such as Drones etc.	K3
		CO2: The students will be able to get a clear understanding of how a greenhouse can be automated and its advantages.	K3
		CO3: The students will be able to apply IT principles and concepts for management of field operations.	K3
		CO4: The students will get an understanding about weather models, their inputs and applications.	K2
		CO5: The students will get an understanding of how IT can be used for e-governance in agriculture.	K2
	GE3751: PRINCIPLE OF MANAGEMENT	**CO1:** Upon completion of the course, students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling.	K1
		CO2: Extract the functions and principles of management.	K4
		CO3: Learn the application of the principles in an organization.	K1
		CO4: Study the various HR related activities.	K1
		CO5: Analyze the position of self and company goals towards business.	K4
	MF3003: REVERSE ENGINEERING	**CO1:** Apply the fundamental concepts and principles of reverse engineering in product design and development.	K3
		CO2: Apply the concept and principles material characteristics, part durability and life limitation in reverse engineering of product design and development.	K3
		CO3: Apply the concept and principles of material identification and process verification in reverse engineering of product design and development.	K3
		CO4: Apply the concept and principles of data processing, part performance and system compatibility in reverse engineering of product design and development.	K3
		CO5: Analyze the various legal aspect	K4

		CO6: Applications of reverse engineering in product design and development.	K3
VIII SEM	**CS3811: Project Work/Internship**	**CO1:** Gain Domain knowledge and technical skill set required for solving industry / research problems	K2
		CO2: Provide solution architecture, module level designs, algorithms	K6
		CO3: Implement, test and deploy the solution for the target platform	K3
		CO4: Prepare detailed technical report, demonstrate and present the work	K6