- **Department Name :- Information Technology**
- **UG Program Name :- B. Tech. in Computer Science and Information Technology**
- **Vision and Mission :-**
  - **Vision:** To become a prominent department of Information Technology producing competent IT professionals with research and innovation skills, inculcating moral values and societal concerns.
  - **Mission:**
    - To offer high quality education through state of art curriculum and innovative teaching & learning practices.

    - To establish state of art laboratories and center of excellence in the field of technology.

    - To adopt professional practice, standards and values.

    - To inculcate problem solving aptitude in graduates with lifelong learning skills to become valuable resource for IT industry and society.

    - To create, share, and apply knowledge in Computer Science and Information Technology, including in interdisciplinary areas that extend the scope of Computer Science and Information Technology to benefit society.

Sr. No.	Program Outcomes
1.	**PO1: Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and IT engineering specialization to the solution of complex engineering problems.
2.	**PO2: Problem analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics and engineering sciences.
3.	**PO3: Design/Development of solutions:** Design and develop IT solutions using domain knowledge for engineering problems that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4.	**PO4: Conduct investigations of problems:** Use fundamental knowledge and engineering skills including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5.	**PO5: Modern tool usage:** Create, select, and apply appropriate techniques, resources, modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6.	**PO6: The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

Sr. No.		Program Outcomes
7.		**PO7: Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of and need for sustainable development.
8.		**PO8: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9.		**PO9: Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10.		**PO10: Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions..
11.		**PO11: Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
12.		**PO12: Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Sr. No.	Program Specific Outcomes
1.	**PSO1: Domain Specific Knowledge:** Apply the relevant methods and techniques to develop solutions in the domains of automation and intelligent systems.
2.	**PSO2: Software Product Development:** Apply the design and deployment principles to deliver a quality software product for the success of business of varying complexity.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
1.	III	CI2011	Discrete Mathematics	1. Evaluate logic statements using the properties of logic. 2. Apply the concepts in discrete data structures such as sets, relations and functions to solve the problems. 3. Use elementary combinatorics to solve counting problems. 4. Solve examples of lattices, algebraic structures. 5. Prove the theorems and properties of lattices, algebraic structures, graphs. 6. Apply graph theory concepts to solve problems of connectivity.

2.		CI2031	Computer Networks	1. Describe the various network components and topologies.
				2. Illustrate the concepts, services, protocols and algorithms used in Computer Networks.
				3. Write the terminology and client-server programs using Berkeley socket programming.
				4. Solve problems related to routing, framing, error correction, detection and IPv4 addressing.
				5. Compare the different services, protocols and algorithms used in Computer Networks.
3.		CI2051	Data Structures and Algorithms	1. Describe the basic terminologies of data structures and algorithms
				2. Write algorithms for operations to be performed on data structures
				3. Demonstrate the working of stack, queue, linked list, tree and graph
				4. Compare static and dynamic representations of linear and non-linear data structures
				5. Choose appropriate data structures while developing solution to the problem
4.		CI2071	Digital Electronics	1. Convert the number from one system to another and vice versa.
				2. Explain the basic gates and realize it using universal gate.
				3. Minimize the given expression using Boolean algebra and Karnaugh Map
				4. Draw a circuit diagram for combinational logic and analyze its properties
				5. Design the sequential logic circuits.
				6. Describe the 8085 architecture, Identify the instruction set and apply it in assembly language programming using modern tools.
5.		CI2091	Computer Networks Lab	1. Implement client server applications using Berkeley Socket programming

				2. Implement programs to demonstrate framing methods, error detecting, correcting methods and routing algorithms. 3. Solve problems based on IPv4 network addressing. 4. Demonstrate the use of various networking tools and utilities. 5. Distinguish between the network hardware and software used for network design.
6.		CI2111	Data Structures and Algorithms Lab	1. Describe the basic terminologies of data structures and algorithms 2. Write algorithms for operations to be performed on data structures 3. Implement stack, queue, linked list, tree and graph data structures in C language 4. Compare static and dynamic representations of linear and non-linear data structures 5. Choose appropriate data structures while developing solution to the problem
7.		CI2131	Digital Electronics Lab	1. Verify the basics of all logic gates using IC Trainer Kit. 2. Demonstrate the working of Combinational circuits on IC Trainer Kit. 3. Demonstrate the working of Sequential circuits on IC Trainer Kit. 4. Implement the 8085 assembly language program using TASM or simulator.
8.		CI2151	Object Oriented Design and Programming Lab	1. Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects. 2. Illustrate dynamic memory management techniques using pointers, constructors, destructors, etc. 3. Implement the concept of function overloading, operator overloading, virtual functions and polymorphism. 4. Apply inheritance with the understanding of early and late binding, usage of exception handling, generic programming.

				5. Develop solution for a given application using various OOPs concepts.
9.		CI2171	Technical Aptitude-I	1. Comprehend the knowledge gained in the course work. 2. Demonstrate the ability in Problem Solving
10.		SH2633	Open Elective-II Professional Skills Development and Foreign Languages –I Professional Leadership Skills	1. Explain the traits of a leadership through real life examples. 2. Exhibit the ability to work effectively in team. 3. Prepare a presentation as per the audience and context requirements
11.		SH2613	Open Elective-II Professional Skills Development and Foreign Languages - I-Interpersonal Skills ('Jeevanvidya' for Work Life Balance)	1. Exhibit interpersonal communication skills. 2. Demonstrate decision-making skills. 3. Apply conflict resolution styles appropriate in different situations. 4. Demonstrate skills to manage balance in work and life. 5. Apply Jeevanvidya wisdom in day to day life.
12.		SH2693	Open Elective-II Professional Skills Development and Foreign Languages –I-Innovation Tools and Methods for Entrepreneurs	1. Explain structured approach to define the problem with every possible detail, identify conflicts and solve them 2. Apply User Journey Map to the selected problem to show user interaction at various stages 3. Analyze the solutions provided by competitors for effectiveness and gaps if any.
13.		SH2593	Open Elective-II	1. Develop skills to build self-esteem and positive attitude.

				Professional Skills Development and Foreign Languages –I--Personal Effectiveness and Body Language	2. Develop interpersonal skills characterized by effective communication and conflict resolution. 3. Discover ways to overcome procrastination. 4. Demonstrate responsiveness towards stress and health issues. 5. Interpret the non-verbal behaviour of a person.
14.			SH2733	Open Elective-II Professional Skills Development and Foreign Languages –-German Language-Basic Level	1. Interpret the language if the next person is speaking slowly and clearly. 2. Make use of the language in routine life with the routing topics like family, shopping, work etc. 3. Demonstrate the language by self-introduction in German with simple sentences.
15.			SH2713	Open Elective-II Professional Skills Development and Foreign Languages –-Japanese Language-Level-III	1. Make use of basic conversations in various situations. 2. Identify the sentence patterns. 3. Explain insights about the communication required for living in Japan. 4. Interpret Japanese work ethics required in their professional career.
1.	IV		SH2043	Mathematics for Data Analytics	1. Compute Karl Pearson's Product moment correlation Coefficient and fit the lines of regression. 2. Compute Discrete probability distribution, Continuous probability distributions and Joint probability distributions. 3. Apply specific probability distributions to real-life examples. 4. Compute the Mathematical formulas for the given fuzzy set. 5. Prove additional properties of alpha-cuts and use extension principle to fuzzy sets. 6. Apply extension principle to fuzzy arithmetic and solve fuzzy equations.

2.		CI2021	Automata Theory	1. Predict the regular expression for given language 2. Design computational models for given language 3. Parse the given string using top down & bottom up parsing 4. Construct the CFG for given language 5. Prove the properties of regular language and context free language
3.		CI2041	Software Engineering	1. Describe fundamental concepts in software engineering and project management 2. Practice software process models for the undertaken software problems 3. Design function-oriented and object oriented models using modern tools. 4. Compare different software testing techniques and strategies. 5. Apply the project management concepts for the undertaken software problems 6. Illustrate concepts of project monitoring and control in software development
4.		CI2061	Computer Organization	1. Describe the basic structure of computers with its different components. 2. Perform the basic arithmetic operations like Number complements and floating points. 3. Analyze the machine's instruction set architecture (ISA). 4. Categorize memory organization and explain the function of each element of a memory hierarchy. 5. Illustrate the different ways of communicating with I/O devices. 6. Classify the different hazards occurred in pipelining.
5.		CE2263	Engineering Mechanics	1. Classify various forces and their effects, to analyze real life problems. 2. Analyze engineering problems applying conditions of equilibrium. 3. Determine Centroid & Moment of Inertia of the geometrical plane lamina

				4. Apply fundamental concepts of Kinematics and Kinetics to analyze practical problems
6.		CI2081	Python lab	1. Explain the concepts in python. 2. Implement program using loops, decision statements and functions in Python. 3. Use object oriented programming with classes and modules using python. 4. Implement file handling and database handling using python. 5. Plot data using appropriate Python visualization libraries.
7.		CE2283	Engineering Mechanics Lab	1. Compare coefficient of friction of various surfaces in contact. 2. Correlate theoretical and practical results of support reactions and Centroid of plane lamina. 3. Verify law of polygon of forces, law of triangle of forces and principle of moment
8.		SH2173	Environmental Science	1. Discuss the importance and sensitivity of environment. 2. Interpret the over exploitation of natural resources and follow the environmental ethics. 3. Explain methods to protect environment and prevent environmental pollution 4. Apply their knowledge and skills to solve environment related problems.
9.		SH2603	Environmental Science Project	1. Utilize scientific methods to solve environmental problems. 2. Evaluate technologies for restoration of degraded environment. 3. Develop presentation and report writing skills. 5. Develop as an individual and in group leadership quality.
10.		CI2101	Technical Aptitude-II	1. Comprehend the knowledge gained in the course work. 2. Demonstrate the ability in Problem Solving
11.		SH2633	Open Elective-II	1. Explain the traits of a leadership through real life examples.

			Professional Skills Development and Foreign Languages –I Professional Leadership Skills	2. Exhibit the ability to work effectively in team. 3. Prepare a presentation as per the audience and context requirements
12.		SH2613	Open Elective-II Professional Skills Development and Foreign Languages - I- Interpersonal Skills ('Jeevanvidya' for Work Life Balance)	1. Exhibit interpersonal communication skills. 2. Demonstrate decision-making skills. 3. Apply conflict resolution styles appropriate in different situations. 4. Demonstrate skills to manage balance in work and life. 5. Apply Jeevanvidya wisdom in day to day life.
13.		SH2693	Open Elective-II Professional Skills Development and Foreign Languages –I- Innovation Tools and Methods for Entrepreneurs	1. Explain structured approach to define the problem with every possible detail, identify conflicts and solve them 2. Apply User Journey Map to the selected problem to show user interaction at various stages 3. Analyze the solutions provided by competitors for effectiveness and gaps if any.
14.		SH2593	Open Elective-II Professional Skills Development and Foreign Languages –I-- Personal Effectivenes	1. Develop skills to build self-esteem and positive attitude. 2. Develop interpersonal skills characterized by effective communication and conflict resolution. 3. Discover ways to overcome procrastination. 4. Demonstrate responsiveness towards stress and health issues. 5. Interpret the non-verbal behaviour of a person.

			s and Body Language	
15.		SH2643	Open Elective-II Professional Skills Development and Foreign Languages –- German Language-Advanced Level	1. Interpret the language if the next person is speaking slowly and clearly. 2. Make use of the language in routine life with the routing topics like family, shopping, work etc. 3. Demonstrate the language by self-introduction in German with simple sentences.
16.		SH2623	Open Elective-II Professional Skills Development and Foreign Languages –- Japanese Language-Level-IV	1. To be able to make basic conversations in various situations. 2. To recognize the sentence patterns. 3. To improve Japanese Language proficiency. 4. To give students insights about the communication required for living in Japan. 5. To expose students to the Japanese work ethics required in their professional careers.
1.	V	CI3011	Operating Systems	1. Explain fundamental concepts in operating systems 2. Apply the concepts of operating systems for the given requirement 3. Select the appropriate algorithm such as scheduling, deadlock, page replacement or disk scheduling for devising solution to the given problem 4. Compare various operating system techniques 5. Justify findings of the given problem using operating system concepts
2.		CI3031	Database Management Systems	1. Describe the fundamental elements of relational database management systems. 2. Design a database using ER-models & schema diagrams to represent simple application scenarios 3. Write SQL/PL-SQL query to perform various operations on the database.

				4. Apply integrity constraints on databases.
				5. Apply concepts of indexing and hashing on databases to index and retrieve items in a database.
				6. Illustrate the transaction management, concurrency control and crash recovery.
3.		CI3051	Design and Analysis of Algorithms	1. Analyzing asymptotically the performance of algorithms.
				2. Compare various searching and sorting algorithms.
				3. Apply different algorithm design techniques to solve real life problems like change making problem, job sequencing, finding shortest path, etc.
				4. Identify appropriate algorithm design strategy that is applicable to a given contextual problem.
				5. Describe Computational complexity theory to classify computational problems according to their inherent difficulty.
4.		CI3071	Program Elective-I - Organizational Management Behavior	1. Describe the primary functions of management.
				2. Identify the financing process of the entrepreneurial business.
				3. Develop strategy with marketing and materials department.
				4. Present/Solve for the case study based on management and organizational behavior concepts.
				5. Describe the distinction between groups, social networks, and formal organizations.
				6. Identify the best culture for different types of organizations.
5.		CI3091	Program Elective-I - IPR and Cyber Laws	1. Describe fundamentals of Intellectual Property Rights.
				2. Justify Information Technology related Intellectual Property Rights.
				3. Interpret Ownership and Enforcement of Intellectual Property.
				4. Compare various cyber-attacks & offenses.
				5. Analyze Indian IT Act 2000 & amendments in IT Act
				6. Construct a strategy for creating awareness about cyber security for e-banking and legal issues among the social community.

6.			CI3111	Program Elective-I - Software Modeling & Design	1. Identify object classes and build the domain model using advanced concepts in object, dynamic and functional modeling. 2. Apply different object-oriented design techniques. 3. Design models using UML diagrams for software systems: use case, class, sequence, collaboration, activity, state chart diagrams, component and deployment. 4. Design software systems using open source and advanced modeling tools. 5. Evaluate designs of software systems in mini-projects, projects using Software Modeling & Design concepts.
7.			CI323	Program Elective-I - Internetworking Protocols	1. Implement the client server programs for network services. 2. Solve the problems related to IPv6 addressing. 3. Illustrate the working of DHCP, DNS, TELNET, SSH, FTP and TFTP, WWW, Email. 4. Compare different application layer protocols. 5. Analyze the packet formats of different protocols.
8.			CI3131	JAVA Programming Lab	1. Explain the concepts and terminologies in java programming language 2. Develop Java applications to address particular software needs by making use of collections frameworks. 3. Create class hierarchy using Java inheritance and interface for given requirement. 4. Implement programs on exception handling, packages, multithreading, file handling, database handlinh using IDE's 5. Design GUI based applications with event handling using AWT and Swing packages.
9.			CI3151	Database Management Systems Lab	1. Draw Schema Diagram on given problem statement. 2. Write SQL query for various operations like retrieval, insertion and manipulation of data etc. 3. Implement PL/SQL cursor, procedure/function and trigger. 4. Implement a program to connect databases to application programs.

				5. Implement basic commands of MongoDB with installation.
9.		CI3171	Operating Systems Lab	1. Identify and use the basic and advanced commands in Unix 2. Practice simple and advanced filters of Unix system using regular expression 3. Implement shell scripts and shell programs for given problems 4. Practice user management administration in Unix
10.		SH3033	Scholastic Aptitude -I	1. Develop a logical approach towards solving Aptitude and Reasoning problems. 2. Analyze usage of basic aptitude terms of percentages, averages, ratios and applications of business aptitude terms of profits and interests 3. Develop a bridge in analogies, series and visualizing directions. 4. Apply various short cuts & techniques to manage speed and accuracy to get equipped for various competitive and campus recruitment exams.
11.		CI3191	Summer Internship	1. Apply the theoretical and practical knowledge of CS/IT Engineering for product/service development. 2. Undergo real time IT Industry practices regarding product/service development. 3. Identify and analyze engineering problems to provide IT based solutions. 4. Adopt recent industry practices for project development 5. Improve the ability to work in teams 6. Enhance technical skills for solving complex engineering problems.
12.		CI3211	Technical Aptitutude-III	1. Comprehend the knowledge gained in the course work. 2. Demonstrate the ability in Problem Solving
13.		SH3011	Indian Constitution	1. Create awareness about law depiction and importance of Constitution 2. Define Fundamental Rights and Fundamental Duties of the Indian Citizen to instill morality, social values, honesty, dignity of life and their social Responsibilities.

				3. Create Awareness of their Surroundings, Society, Social problems and their suitable solutions while keeping rights and duties of the citizen keeping in mind.
				4. Recognize distribution of powers and functions of Local Self Government.
				5. Comprehend the National Emergency, Financial Emergency and their impact on Economy of the country.
1.	VI	CI3021	Information Security	1. Describe the key components of information security. 2. Analyze different threats and attacks modes. 3. Apply cipher techniques and cryptographic algorithms & tools. 4. Present the ways to provide access control like authorization and authentication. 5. Compare the security provisions in network, operating system and web applications. 6. Discuss the purpose and need for intrusion detection system (IDS) and intrusion prevention system (IPS).1
2.		CI3041	Program Elective-II – Data Mining	1. Explain different fundamental concepts of data mining. 2. Apply and differentiate different classification and clustering algorithms to any given data set. 3. Apply and differentiate different data mining algorithms to generate association rules. 4. Predict the outcome of certain problem using appropriate data mining techniques. 5. Apply text mining to mine data. 6. Use advance techniques and software's for web mining.
3.		CI3061	Program Elective-II - Sensor Networks	1. Explain the basic terminology of sensor networks. 2. Explain the architecture and concepts of sensor networks. 3. Identify the different platforms, communication technologies and protocols in sensor networks. 4. Apply time-synchronization strategy for any wireless sensor application.

				5. Identify the security issues and challenges in wireless sensor network.
				6. Compare different Sensor Network Platforms and Tools.
4.		CI3081	Program Elective-II - Machine Learning Algorithms	1. Explain different concepts of Machine Learning algorithm.
				2. Apply regression, classification and clustering algorithms to solve the problems.
				3. Analyze regression, classification and clustering technique.
				4. Elaborate the working of the Recommendation System and its importance in different application domains.
				5. Evaluate performance of Artificial Neural Networks on different parameters such as architecture, learning rate etc.
5.		CI3101	Program Elective-II – Computer Graphics	1. Generate the 2D and 3D transformations of different objects.
				2. Create the interactive computer graphics using the OpenGL API.
				3. Apply clipping techniques on different graphics.
				4. Represent the different curves and surfaces.
				5. Design animation sequences for different objects.
				6. Apply the Illumination and color model on different objects.
6.		OE336	Open Elective-IV - Neural Network and Deep Learning	1. Understand the mathematical foundations of neural network models.
				2. Understand and apply the backpropagation learning algorithm.
				3. Illustrate the architecture, building blocks and challenges of deep networks.
				4. Elaborate and compare different deep network architectures.
				5. Identify and effectively apply neural networks and deep networks for the problem.
				6. Design neural network and deep network systems to solve real world problems.
7.		OE3221	Open Elective-IV Cyber Forensics	1. Explain the fundamentals of computer forensics
				2. Assess different cyber attacks and crimes.

					3. Analyze Windows and Linux operating systems for data recovery and preserving. 4. Design acquisition procedures for cell phones and mobile devices. 5. Compare various browsers with respect to their functionality & investigation. 6. Demonstrate penetration testing using various tools & modern techniques.
8.		SH3021	Biology for Engineers		1. Apply biological engineering principles, procedures needed to solve real-world problems 2. Describe the functions of biological systems 3. Analyze biological phenomena and compute work done at microscale. 4. Explain working of different biomedical instruments 5. Select the sensors for given biological applications 7. Explain relevant aspect of movement control process.
9.		CI3181	Front End Web Technology Lab		1. Design visualizations in accordance with UI/UX theories. 2. Developing web pages using HTML and CSS. 3. Implementing responsive web pages by applying bootstrap technology. 4. Designing interactive web pages using JavaScript and JQuery. 5. To build components, use directive, work with data binding and using different angular JS services. 6. Apply best practices when building Angular JS apps. .
10.		CI3201	Mobile Application Development Lab		1. Explain the basic concepts and terminologies of Android technology 2. Design User Interfaces using views, layout managers, menus and dialogs 3. Make use of shared preferences, files and SQLite database for persistent data storage and multimedia in android application 4. Develop mobile application using activity, services, content providers and broadcast receivers of Android Technology

				5. Apply testing frameworks, packaging and deploy android application to emulators and physical devices
11.		SH3063	Scholastic Aptitude -II	1. Develop a logical approach towards solving Aptitude and Reasoning Problems 2. Analyze usage of aptitude terms of speed, time and distance and permutations, probabilities and applications. 3. Understand blood relations and ways of seating arrangements along with various geometrical figures 4. Apply various short cuts & techniques to manage speed and accuracy to get equipped for various competitive and campus recruitment exams.
12.		CI3241	Technical Aptitude - IV	1. Comprehend the knowledge gained in the course work. 1. Demonstrate the ability in Problem Solving
13.		CI3221	Capstone Project Phase-I	1. Apply the theoretical and practical knowledge of CS/IT Engineering for product/service development 2. Identify and analyze engineering problems to provide IT based solutions 3. Design efficient algorithms for better products/services 4. Adopt recent industry practices for project development 5. Improve the ability to work in teams 6. Develop effective presentation and communication skills through projects 7. Manage the project in terms of scope, cost, time and quality of project as defined by stakeholders
14.		SH304	Psychology for Engineers	1. Interpret human behavior as a system from a psychological perspective. 2.Appraise the various factors affecting human behavior at work. 3. Apply behavioral theories to manage/lead people and emotions at work.

1.	VII	CI401	Cloud Computing	1. 1. Understand the technological changes in computing technologies. 2. Compare the architectures and service & deployment models of cloud computing. 3. Explore the need and importance of virtualization technologies. 4. Explore and identify different cloud platforms. 5. Explore the business issues and applications of cloud computing in different sectors.
2.		CI403	Neural Network and Deep Learning	1. Describe the ideological basics of artificial neural networks. 2. Identify the different structures of artificial neural networks. 3. Formalize the problem and solve it by using a neural network. 4. Illustrate the fundamental issues and challenges of Deep learning. 5. Design the various deep neural network systems. 6. Implement various Deep learning algorithms in a range of real-world applications.
3.		CI405	Parallel Computing (PE-IV)	1 Summarize parallel programming technique and compare it with Sequential Programming 2 Develop programs to use multi-core processors using OpenMP 3 Write an parallel programs using MPI 4 Explore different features of the CUDA framework. 5 Identify the different CUDA capable GPU platforms. 6 Design a parallel algorithm for any compute-intensive application.
4.		CI407	Big Data (PE-IV)	1. Understand the need of Big data Technologies. 2. Write program using Map Reduce framework. 3. Describe Hadoop and its component 4. Write the queries using HIVEQL 5. Use Hadoop ecosystem like Pig and Hive to build application

5.		CI409	Computer Graphics (PE-IV)	1. Generate the 2D and 3D transformations of different objects. 2. Create the interactive computer graphics using the OpenGL API. 3. Apply clipping techniques on different graphics. 4. Represent the different curves and surfaces. 5. Design animation sequences for different objects. 6. Apply the Illumination and color model on different objects.
6.		CI411	Data Analytics (PE-IV)	1. Differentiate the characteristics of datasets and compare the trivial data and big data for various applications. 2. Select and implement techniques and computing environment that are suitable for the data analytical applications. 3. Solve problems associated with the data characteristics such as high dimensionality, dynamically growing data and in particular scalability issues. 4. Understand and apply scaling up machine learning techniques and associated computing techniques and technologies for data analytical. 5. Provide problem solutions for multi-core or distributed, concurrent/Parallel environments.
7.		CI413	Blockchain Technology (PE-IV)	1. Differentiate Blockchain models. 2. Analyze Components & Consensus models of Blockchain. 3. Discuss Forking & Cryptographic concepts of Blockchain. 4. Describe applications of Blockchain in the sector of Trade, Government & Finance 5. Explain research aspects of Blockchain
8.		CI415	Internet of Things (PE-V)	1. Describe the applications, basic terminologies and fundamentals of IoT. 2. Illustrate the different IoT platforms, communication standards and protocols. 3. Identify the security issues and challenges in IoT. 4. Design and develop the IoT solutions for real word problems. Prepare an IoT case studies for smart applications.

9.		CI417	Virtual Reality and Augmented Reality (PE-V)	1. Describe the basic concept and framework of virtual reality and development tools.
				2. Illustrate the principles and multidisciplinary features of virtual reality
				3. Describe the technology for multimodal user interaction and perception in VR (visual, audial and haptic interface and behavior).
				4. Discuss the technologies for managing large-scale VR environment in real time.
				5. Analyze the virtual reality issues.
10.		CI419	Front End Web Technology Lab	1. Design and develop elegant and responsive Front-end by leveraging latest technologies
				2. Build strong foundations (ex: Design pattern) in entry level engineers thereby making them job ready as per industry requirements.
				3. Learn new technologies by applying foundation paradigms
				4. Become an industry-ready engineer who can be readily deployed in a project
				5. Design and develop websites using fundamental web languages, technologies, and tools.
				6. Apply the concepts of web technologies for the given requirement
11.		CI421	Advanced Java Laboratory (PE Lab)	1. Use Bootstrap to make web application responsive.
				2. Build fast and interactive web application using JQuery and Angular JS2
				3. Develop dynamic, server-side applications using Servlets.
				4. Develop dynamic, server-side applications using JSP.
				5. Build web applications using Hibernate framework.
12.		CI423	R Programming (PE Lab)	1. Implementation of core concepts of R programming using R studio and console
				2. Implement basic statistical operations using R Programming.

				3. Apply suitable type of data distributions to different engineering problems
				4. Create charts, plots and vectors for graphical analysis.
				5. Solve Machine Learning Algorithms Using R Programming
13.		CI425	Asp.Net MVC Lab (PE Lab)	1. Develop dynamic web application using ASP.NET.
				2. Apply front end technologies to make web application responsive and fast.
				3. Develop web application using MVC and Entity framework.
				4. Build web services in ASP.NET.
14.		CI427	Capstone Project Phase- II	1. Apply the theoretical and practical knowledge of CS/IT Engineering for product/service development
				2. Identify and analyze engineering problems to provide IT based solutions
				3. Design efficient algorithms for better products/services
				4. Develop the project using modern IT tools, techniques and technologies
				5. Adopt recent industry practices for project development
				6. Improve the ability to work in teams