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III SEM

Course Name (Course Code): Statistics and Probability Theory (MAUL301)

CO	Course Outcomes
MAUL301.1	**Understand** the basic concepts of Probability, Baye's Law, Bernoulli's trial.
MAUL301.2	**Determine** probability distributions, expectations, moments, MGF, mean and variances of the discrete and continuous random variables
MAUL301.3	**Illustrate** different probability distributions like Binomial, Poisson, Normal, Uniform, Exponential Distribution
MAUL301.4	**Compute** the correlation, regression and best fit curves
MAUL301.5	**Apply** the concepts of Queuing theory and Markov chain

Course Name (Course Code): Managerial Economics and Financial Accounting (HSUL301)

CO	Course Outcomes
HSUL301.1	Describe economic fundamentals like deductive versus inductive methods and concepts and measurement of national income.
HSUL301.2	Describe different types of demand and supply.
HSUL301.3	Explain the production and cost analysis laws, concepts, and their implications.
HSUL301.4	Interpret the importance of capital and accounting in running a business
HSUL301.5	Analyze financial statements like balance sheets and profit & loss statements.

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Course Name (Course Code): Data Structures and Algorithms (CSUL301)

CSUL301.1	Explain the concept of asymptotic principles for estimating the time complexity of various algorithms.
CSUL301.2	Describe stack and queue with their applications.
CSUL301.3	Apply operations of linked list to solve computational problems.
CSUL301.4	Analyze non-linear data structure algorithms for solving real life problems like shortest path and MST.
CSUL301.5	Compute the efficiency of the principal algorithms for sorting, searching, and hashing.

Course Name (Course Code): Operating System (CSUL302)

CO	Course Outcomes
CSUL302.1	**Understand** the basic concepts of operating systems, processes, system calls, threads, and files.
CSUL302.2	**Describe** the mechanisms of inter-process communication, synchronization, and mutual exclusion using semaphores and classical problems.
CSUL302.3	**Demonstrate** the working of deadlock prevention, detection, avoidance, and recovery techniques.
CSUL302.4	**Analyze** memory management techniques such as paging, segmentation, and page replacement algorithms.
CSUL302.5	**Evaluate** file systems and I/O management strategies based on allocation methods, protection mechanisms, and disk scheduling algorithms

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Course Name (Course Code): Software Engineering and Project Management (CSUL303)

CO	Course Outcomes
CSUL303.1	**Understand** the various software development life cycle models and their characteristics
CSUL303.2	**Apply** requirement elicitation, analysis techniques, and formal specification methods.
CSUL303.3	**Illustrate** basic UML diagrams to represent software architecture and design.
CSUL303.4	**Classify** different software testing techniques and various tools for defect detection.
CSUL303.5	**Evaluate** various software project estimation methods, risk management strategies, and quality assurance practices.

Course Name (Course Code): Digital Electronics (CSUL304)

CO	Course Outcomes
CSUL304.1	***Describe*** the structure of various number systems and codes.
CSUL304.2	***Explain*** the basic logic gates, Boolean algebra and derive digital logic circuits.
CSUL304.3	***Apply*** various boolean expression minimization techniques to obtain optimum logic circuit design.
CSUL304.4	***Analyze*** the design of various combinational circuits and sequential circuits.
CSUL304.5	***Compare*** characteristics of various logic families and calculate their parameters.

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V SEMESTER

Course Name (Course Code): Design and Analysis of Algorithms (CSUL-501)

CO	Outcomes
CSUL501.1	**Apply** divide and conquer, greedy method and dynamic programming techniques to solve diverse engineering challenges.
CSUL501.2	**Apply** Branch and Bound, and pattern-matching algorithms to solve complex problems
CSUL501.3	**Examine** randomized and assignment problems for real-time applications.
CSUL501.4	**Categorize** problems into the P, NP, NP-Complete, and NP-Hard classes for specific problems.
CSUL501.5	**Analyze** the time complexity of various algorithms using asymptotic notations.

Course Name (Course Code): Machine Learning (CSUL502)

CO	Course Outcomes
CSUL502.1	**Explain** the fundamentals of Machine Learning, data pre-processing techniques, and their real-world applications.
CSUL502.2	**Apply** supervised learning algorithms for regression and classification, and evaluate performance.
CSUL502.3	**Implement** unsupervised learning, clustering, and association rule mining techniques for knowledge discovery.
CSUL502.4	**Employ** feature selection methods and appropriate evaluation metrics to enhance the predictive performance of machine learning models.
CSUL502.5	**Analyze** feature engineering, dimensionality reduction, and recommendation systems to build efficient machine learning solutions.

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Course Name (Course Code): Cryptography and Network Security (CSUL503)

CO	Course Outcomes
CSUL503.1	**Understand** Security Principles, Attacks, Services and basic cryptographic techniques
CSUL503.2	**Apply** different Encryption approaches in Modern Block Cipher based Cryptosystems
CSUL503.3	**Analyze** Authentication secure communication protocols. and their functional components with underlying mathematical principles
CSUL503.4	**Examine** transport-level and wireless security protocols used in modern communication networks.
CSUL503.5	**Evaluate** wireless network security and intrusion detection techniques.

Course Name (Course Code): Full Stack Development (CSUL504)

CO	Course Outcomes
CSUL504.1	Describe the concepts of Internet and World Wide Web including web browsers, web servers, URLs, and web standards used for web application development.
CSUL504.2	Apply HTML, CSS, and Tailwind CSS to design and develop static and responsive web pages with appropriate text formatting, tables, images, lists, and forms.
CSUL504.3	Illustrate the use of JavaScript, DOM manipulation, AJAX, jQuery, JSON, and ES6 features to develop interactive and dynamic web applications.
CSUL504.4	Evaluate single page applications using ReactJS by implementing components, JSX, routing, forms, Redux basics, and client-server communication.
CSUL504.5	Design server-side applications using Node.js and Express.js to create RESTful APIs, handle middleware, manage form data, and serve static content.

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Course Name (Course Code): DevOps Practices and Principles (CSUL511)

CO	Course Outcomes
CSUL511.1	Describe the concepts of DevOps, its lifecycle, principles, and Infrastructure as Code (IaC).
CSUL511.2	Apply Git commands for version control and repository management.
CSUL511.3	Illustrate Continuous Integration using Jenkins and build automation tools.
CSUL511.4	Analyze Continuous Deployment, Docker, and containerization concepts.
CSUL511.5	Evaluate Kubernetes deployments using monitoring and observability tools.

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VII SEMESTER

Course Name (Course Code): Internet of Things (7CS4-01)

CO	Course Outcomes
7CS4-01.1	**Understand** the designs of IoT in Mobile Devices, Cloud & Sensor networks and various IoT levels & deployment templates.
7CS4-01.2	**Describe** the architecture, hardware components, software stack, and operating systems used in IoT systems.
7CS4-01.3	**Demonstrate** the reference model, architectural style and various challenges associated with IoT.
7CS-01.4	**Analyze** the functional relationships between the core components of IoT and M2M paradigms, and between the control planes of traditional networking and SDN architectures.
7CS4-01.5	**Evaluate** IoT application areas through in-depth case studies.

Course Name (Course Code): Environmental Engineering and Disaster Management (7AG6-60.2)

7AG6-60.2.1	**Demonstrate** knowledge of water supply systems by calculating domestic water requirements and selecting suitable sources, intake structures, and conveyance methods for urban and rural areas
7AG6-60.2.2	**Examine** drinking water quality parameters with reference to Indian Standards and differentiate suitable treatment methods to ensure safe drinking water and sanitation
7AG6-60.2.3	**Implement** principles of wastewater engineering to determine wastewater quantity, illustrate its characteristics, and choose suitable disposal methods in urban and rural contexts
7AG6-60.2.4	**Investigate** sewer system requirements, wastewater characteristics, solid waste disposal methods, and air pollution parameters, and test compliance with BIS standards for treatment and abatement.
7AG6-60.2.5	**Classify** types of disasters, interpret their impacts, and analyze disaster management principles to formulate effective mitigation and preparedness strategies.

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III SEMESTER LAB

Course Name (Course Code): Data Structures and Algorithms Lab (CSUP320)

CO	Course Outcomes
CSUP320.1	Implement basic data structures including Arrays and Link lists
CSUP320.2	Apply Stack and Queue to solve computational problems
CSUP320.3	Apply, searching and sorting techniques to develop efficient solution for computational problems.
CSUP320.4	Analyze various tree traversal techniques and related operations.
CSUP320.5	Analyze graph traversals methods and shortest path algorithms.

Course Name (Course Code): Programming in Java Lab (CSUP-321)

CO	Course Outcomes
CSUP321.1	**Describe** object-oriented concepts, java program structure and its installation.
CSUP321.2	**Demonstrate** Object oriented constructs such as various class hierarchies, interfaces and Packages.
CSUP321.3	**Apply** String handling technique using String & StringBuffer classes
CSUP321.4	**Implement** an application involving Thread and Exception handling.
CSUP321.5	**Evaluate** file handling mechanism for Java applications

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Course Name (Course Code): Software Engineering Lab (CSUP-322)

CO	Course Outcomes
CSUP322.1	**Explain** Software Requirements Specification (SRS) document for a given problem statement in the prescribed IEEE template with the help of CASE tools.
CSUP322.2	**Apply** comprehensive structural and behavioral UML diagrams for a given problem statement
CSUP322.3	**Demonstrate** DFD (level-0, level-1 and level-2) and data dictionary for a given problem statement.
CSUP322.4	**Illustrate** how to manage and track given problem statement using Project management tools.
CSUP322.5	**Evaluate** the test cases for the given problem using software testing techniques and Tools.

Course Name (Course Code): Digital Electronics Lab (CSUP323)

CO	Course Outcomes
CSUP323.1	**Implement** basic logic gates using universal gates on a breadboard.
CSUP323.2	**Simulate** the functionality of digital circuits using VHDL.
CSUP323.3	**Analyze** various combinational logic circuits (e.g., adders, multiplexers, parity generators) based on boolean expressions in SOP/POS form.
CSUP323.4	**Test** the sequential circuits (e.g., flip-flops, counters, shift registers) using the logic gate ICs.
CSUP323.5	**Create** advanced digital systems such as ALU, VHDL-based logic circuits, and mini projects by integrating combinational and sequential building blocks.

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Course Name (Course Code): Industrial Training (CSUT-330)

CO	Course Outcomes
CSUT330.1	Interpret fundamental project requirement analysis and make comprehensive use of acquired technical knowledge during the training, to understand industrial processes.
CSUT330.2	Apply theoretical knowledge acquired in academic courses to solve practical problems encountered in real - world scenarios.
CSUT330.3	Demonstrate professional ethics, teamwork, communication, and continuous learning behaviour in the work environment through a compelling presentation that effectively conveys complex information.
CSUT330.4	Analyze user requirements, data flow, or system performance to identify and propose possible improvements.
CSUT330.5	Develop software modules or tools using modern technologies and development platforms, while synthesizing findings into a comprehensive, well-structured report.

Course Name (Course Code): SODECA (CSUA300)

CO	Course Outcomes
CSUA300.1	Understand the importance of adhering to institutional rules and norms, showcasing respectful and disciplined behaviour in their academic interactions.
CSUA300.2	Demonstrate the ability to leverage technology platforms while integrating technical expertise with project management, effectively balancing technical and resource needs in organizing projects.
CSUA300.3	Analyze practical skills in organizing and participating in cultural and sports events by planning, coordinating, and executing various activities, demonstrating leadership and improving their problem-solving abilities.
CSUA300.4	Develop a sense of responsibility toward community service and actively engage in social outreach programs, contributing positively to societal needs.
CSUA300.5	Build the ability to engage in independent and lifelong learning by continuously acquiring new knowledge, adapting to emerging technologies, and enhancing professional skills to address evolving challenges in the field of technology.

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V SEMESTER (LAB)

Course Name (Course Code): DAA Lab (CSUP-520)

CO	Course Outcomes
CSUP520.1	**Demonstrate** graph traversal techniques and Branch and Bound methods to explore solution spaces.
CSUP520.2	**Illustrate** divide-and-conquer techniques to solve computational problems on various competitive coding platforms.
CSUP520.3	**Examine** Greedy algorithms to develop optimal solutions for optimization problems on various competitive coding platforms.
CSUP520.4	**Analyze** Dynamic Programming to solve multi-stage decision problems on various competitive coding platforms efficiently.
CSUP520.5	**Analyze** the performance of various string pattern matching algorithms.

Course Name (Course Code): Machine Learning Lab (CSUP521)

CO	Course Outcomes
CSUP521.1	**Implement** appropriate data preprocessing techniques using standard datasets.
CSUP521.2	**Examine** supervised machine learning algorithms for solving classification and prediction problems.
CSUP521.3`	**Compare** unsupervised learning techniques for discovering hidden patterns in datasets.
CSUP521.4	**Analyze** machine learning models using feature processing and validation techniques to improve prediction accuracy.
CSUP521.5	**Design** machine learning-based solutions for real-world engineering applications.

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Course Name (Course Code): Full Stack Development Lab (CSUP522)

CO	Course Outcomes
CSUP522.1	Explain fundamental HTML and CSS concepts to design static and responsive web pages with proper structure, formatting and styling.
CSUP522.2	Use JavaScript to create interactive web pages by handling events, manipulating the DOM, and fetching data asynchronously using AJAX.
CSUP522.3	Apply jQuery, JSON, and ES6 features to simplify client-side programming, manage user interactions and process structured data efficiently.
CSUP522.4	Analyze single-page applications (SPAs) using ReactJS, including functional components, JSX, state management and routing for seamless navigation.
CSUP522.5	Develop server-side applications using Node.js, Express.js and MongoDB to create RESTful APIs and full-stack web applications with CRUD operations and authentication.

Course Name (Course Code): Programming for Problem Solving-I (CSUP523)

CO	Course Outcomes
CSUP523.1	**Apply** programming fundamentals, arrays, strings, and recursion to solve computational problems efficiently.
CSUP523.2	**Use** linear data structures such as linked lists, stacks, and queues to solve real-world programming problems.
CSUP523.3	**Illustrate** the process of efficient algorithm design using searching, sorting, hashing, trees, and heap-based data structures.
CSUP523.4	**Recommend** algorithms by considering paradigms like recursion, backtracking, greedy methods, and graph traversal techniques (BFS/DFS) to solve complex programming problems.
CSUP523.5	**Develop** programming solutions using programming fundamentals, arrays, strings, and recursion for efficient problem solving.

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Course Name (Course Code): Industrial Training (CSUT-530)

CO	Course Outcomes
CSUT530.1	Interpret fundamental project requirement analysis and make comprehensive use of acquired technical knowledge during the training, to understand industrial processes.
CSUT530.2	Apply theoretical knowledge acquired in academic courses to solve practical problems encountered in real - world scenarios.
CSUT530.3	Demonstrate professional ethics, teamwork, communication, and continuous learning behaviour in the work environment through a compelling presentation that effectively conveys complex information.
CSUT530.4	Analyze user requirements, data flow, or system performance to identify and propose possible improvements.
CSUT530.5	Develop software modules or tools using modern technologies and development platforms, while synthesizing findings into a comprehensive, well-structured report.

Course Name (Course Code): SODECA (CSUA500)

CO	Course Outcomes
CSUA500.1	Understand the importance of adhering to institutional rules and norms, showcasing respectful and disciplined behaviour in their academic interactions.
CSUA500.2	Demonstrate the ability to leverage technology platforms while integrating technical expertise with project management, effectively balancing technical and resource needs in organizing projects.
CSUA500.3	Analyze practical skills in organizing and participating in cultural and sports events by planning, coordinating, and executing various activities, demonstrating leadership and improving their problem-solving abilities.
CSUA500.4	Develop a sense of responsibility toward community service and actively engage in social outreach programs, contributing positively to societal needs.
CSUA500.5	Build the ability to engage in independent and lifelong learning by continuously acquiring new knowledge, adapting to emerging technologies, and enhancing professional skills to address evolving challenges in the field of technology.

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VII SEMESTER

: VII (LAB)

Course Name (Course Code): IoT Lab (7CS4-21)

CO	Course Outcomes
7CS4-21.1:	Explain the concept and Application of Internet of Things.
7CS4-21.2:	Illustrate key technologies, protocols and standards in Internet of Things.
7CS4-21.3	Analyse trade-offs in interconnected wireless embedded device networks
7CS4-21.4:	Application of IoT in automation of Commercial and Real-World examples
7CS4-21.5:	Design a simple IoT system comprising sensors, edge devices and wireless network connections involving prototyping, programming and data analysis.

Course Name (Course Code): Cyber Security Lab (7CS4-22)

CO	Outcomes
7CS4-22.1	Apply the cryptographic algorithms for data communication.
7CS4-22.2	Apply different types of attacks on various cryptographic algorithms.
7CS4-22.3	Apply the Digital signature for secure data transmission and secure data storage.
7CS4-22.4	Analyze the different open-source tools for network security and analysis.
7CS4-22.5	Develop a Secure Architecture for small enterprise.

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Course Name (Course Code): Industrial Training (7CS7-30)

CO	Course Outcomes
7CS7-30.1	Interpret fundamental project requirement analysis and make comprehensive use of acquired technical knowledge during the training, to understand industrial processes.
7CS7-30.2	Apply theoretical knowledge acquired in academic courses to solve practical problems encountered in real - world scenarios.
7CS7-30.3	Demonstrate professional ethics, teamwork, communication, and continuous learning behaviour in the work environment through a compelling presentation that effectively conveys complex information.
7CS7-30.4	Analyze user requirements, data flow, or system performance to identify and propose possible improvements.
7CS7-30.5	Develop software modules or tools using modern technologies and development platforms, while synthesizing findings into a comprehensive, well-structured report.

Course Name (Course Code): Seminar (7CS7-40)

CO	Course Outcomes
7CS7-40.1	**Identify** the topic in an emerging area and the relevant background literature.
7CS7-40.2	**Analyze** research papers and technical information to identify key concepts, methodologies, and recent developments in the chosen domain.
7CS7-40.3	**Evaluate** the significance, limitations, and future scope of the selected technology based on critical analysis of the literature.
7CS7-40.4	**Design** an effective technical seminar using appropriate presentation techniques.
7CS7-40.5	**Prepare** a well-structured technical seminar report and presentation by organizing and synthesizing information from authentic sources.

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Course Name (Course Code): SODECA (7CS8-00)

CO	Course Outcomes
7CS8-00.1	Understand the importance of adhering to institutional rules and norms, showcasing respectful and disciplined behaviour in their academic interactions.
7CS8-00.2	Demonstrate the ability to leverage technology platforms while integrating technical expertise with project management, effectively balancing technical and resource needs in organizing projects.
7CS8-00.3	Analyze practical skills in organizing and participating in cultural and sports events by planning, coordinating, and executing various activities, demonstrating leadership and improving their problem-solving abilities.
7CS8-00.4	Develop a sense of responsibility toward community service and actively engage in social outreach programs, contributing positively to societal needs.
7CS8-00.5	Build the ability to engage in independent and lifelong learning by continuously acquiring new knowledge, adapting to emerging technologies, and enhancing professional skills to address evolving challenges in the field of technology.