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Programme: B.Tech. (Computer Science & Engineering-IOT)

Semester: III

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.
HSUL301.3	***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 (CIUL301)

CO	Course Outcomes
CIUL301.1	Explain the concept of asymptotic principles for estimating the time complexity of various algorithms.
CIUL301.2	Describe stack and queue with their applications.
CIUL301.3	Apply operations of linked list to solve computational problems.
CIUL301.4	Analyze non-linear data structure algorithms for solving real life problems like shortest path and MST.
CIUL301.5	Compute the efficiency of the principal algorithms for sorting, searching, and hashing.

Course Name (Course Code): ES for IOT (CIUL 302)

CO	Course Outcomes
CIUL302.1	**Describe** the fundamentals of electronic devices for IoT applications.
CIUL302.2	**Explain** the principles of designing power management circuits for IoT devices.
CIUL302.3	**Demonstrate** the operation of semiconductor devices such as diodes, BJTs, and FETs in IoT applications.
CIUL302.4	**Analyze** the application of Linear ICs as Sensor interface circuits.
CIUL302.5	**Analyze** the performance of signal conditioning circuits for IoT applications.

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Programme: B.Tech. (Computer Science & Engineering-IOT)

Course Name (Course Code): Software Engineering and Project Management (CIUL303)

CO	Course Outcomes
CIUL303.1	**Understand** the various software development life cycle models and their characteristics
CIUL303.2	**Apply** requirement elicitation, analysis techniques, and formal specification methods.
CIUL303.3	**Illustrate** basic UML diagrams to represent software architecture and design.
CIUL303.4	**Classify** different software testing techniques and various tools for defect detection.
CIUL303.5	**Evaluate** various software project estimation methods, risk management strategies, and quality assurance practices.

Course Name (Course Code): Digital Electronics (CIUL304)

CO	Course Outcomes
CIUL304.1	***Describe*** the structure of various number systems and codes.
CIUL304.2	***Explain*** the basic logic gates, Boolean algebra and derive digital logic circuits.
CIUL304.3	***Apply*** various boolean expression minimization techniques to obtain optimum logic circuit design.
CIUL304.4	***Analyze*** the design of various combinational circuits and sequential circuits.
CIUL304.5	***Compare*** characteristics of various logic families and calculate their parameters.

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V SEMESTER

Course Name (Course Code): Embedded System Design (CIUL501)

CO	Course Outcomes
CIUL501.1	***Explain*** the architecture, characteristics, memory organization, buses, timers, interrupts, and peripheral interfaces of embedded systems and 8051 microcontrollers to differentiate them from general-purpose computing systems.
CIUL501.2	***Understand*** real-time embedded systems using RTOS concepts such as task scheduling, synchronization, inter-process communication, timers, interrupt handling, and resource management to satisfy real-time application requirements.
CIUL501.3	***Apply*** 8051 assembly language programming concepts, addressing modes, instruction set, interrupts, ISR handling, context switching, and shared-data management to develop embedded applications.
CIUL501.4	***Analyze*** embedded software using program models, data flow graphs (DFG), state machine models, event-driven programming, and multiprocessing concepts for efficient system design.
CIUL501.5	***Integrate*** peripheral devices including LEDs, switches, LCD, keyboard, ADC, DAC, sensors, serial communication interfaces (USART), and external memory with the 8051 microcontroller for embedded system implementation.

Course Name (Course Code): Machine Learning (CIUL502)

CO	Course Outcomes
CIUL502.1	**Explain** the fundamentals of Machine Learning, data preprocessing techniques, and their real-world applications.
CIUL502.2	**Apply** supervised learning algorithms for regression and classification, and evaluate performance.
CIUL502.3	**Implement** unsupervised learning, clustering, and association rule mining techniques for knowledge discovery.
CIUL502.4	**Employ** feature selection methods and appropriate evaluation metrics to enhance the predictive performance of machine learning models.
CIUL502.5	**Analyze** feature engineering, dimensionality reduction, and recommendation systems to build efficient machine learning solutions.

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Course Name (Course Code): Automata Theory and Compiler Design (CIUL503

CO	Course Outcomes
CIUL503.1	**Describe** the concepts of formal languages, finite automata, regular expressions**,** major phases of compilers and lexical analysis
CIUL503.2	Illustrate different types of parser designs based on Context-Free Grammar (CFG).
CIUL503.3	Apply Syntax-Directed Definitions (SDDs), syntax trees, and Directed Acyclic Graphs (DAGs) to generate intermediate code and three-address code representations.
CIUL503.4	**Classify** various storage allocation strategies and data structures used in symbol tables.
CIUL503.5	Analyze various optimization techniques using Control Flow Graphs (CFGs) for generating efficient machine code from source code written in a high-level language.

Course Name (Course Code): Artificial Intelligence (CIUL504)

CO	Course Outcomes
CIUL504.1	Understand fundamental concepts of AI with intelligent agents and environments.
CIUL504.2	Understand different applications of AI such as NLP, computer vision, Robotics etc.
CIUL504.3	Apply various uninformed and informed search techniques to solve well-defined problems.
CIUL504.4	Analyze different knowledge representation methods and reasoning approaches including propositional and predicate logic.
CIUL504.5	Compare various machine learning paradigms including deep learning and neural networks.

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Programme: B.Tech. (Computer Science & Engineering-IOT)

Course Name (Course Code): Cryptography and Network Security (CIUL512)

CO	Course Outcomes
CIUL512.1	**Understand** Security Principles, Attacks, Services and basic cryptographic techniques
CIUL512.2	**Apply** different Encryption approaches in Modern Block Cipher based Cryptosystems
CIUL512.3	**Analyze** Authentication secure communication protocols. and their functional components with underlying mathematical principles
CIUL512.4	**Examine** transport-level and wireless security protocols used in modern communication networks.
CIUL512.5	**Evaluate** wireless network security and intrusion detection techniques.

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VII Semester Theory

Course Name (Course Code): Data Science for IoT (7CIT4-01)

CO	Course Outcomes
7CIT4-01.1	**Identify** the key components of IoT systems and their roles
7CIT4-01.2	**Apply** data analysis techniques to extract meaningful insights from IoT-generated data.
7CIT4-01.3	**Implement** data-driven solutions tailored to specific IoT applications.
7CIT4-01.4	**Analyze** various IoT communication protocols and security measures.
7CIT4-01.5	**Evaluate** the ethical and societal implications associated with IoT data.

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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Semester: III Lab

Course Name (Course Code): Data Structures and Algorithms Lab (CIUP320)

CO	Course Outcomes
CIUP320.1	Implement basic data structures including Arrays and Link lists
CIUP320.2	Apply Stack and Queue to solve computational problems
CIUP320.3	Apply searching and sorting techniques to develop efficient solution for computational problems.
CIUP320.4	Analyze various tree traversal techniques and related operations.
CIUP320.5	Analyze graph traversals methods and shortest path algorithms.

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

CO	Course Outcomes
CIUP321.1	**Describe** object-oriented concepts, java program structure and its installation.
CIUP321.2	**Demonstrate** Object oriented constructs such as various class hierarchies, interfaces and Packages.
CIUP321.3	**Apply** String handling techniques using String & StringBuffer classes
CIUP321.4	**Implement** an application involving Thread and Exception handling.
CIUP321.5	**Evaluate** file handling mechanism for Java applications

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Course Name (Course Code): ES for IOT Lab (CIUP322)

CO	Course Outcomes
CIUP322.1	List the components and connections in basic analog circuits such as amplifiers, rectifiers, regulators, and comparators.
CIUP322.2	Explain the working principles of BJT amplifiers, rectifiers, op-amp configurations, and Zener regulators.
CIUP322.3	Demonstrate the implementation and testing of analog electronic circuits using standard laboratory instruments.
CIUP322.4	Analyze the output waveforms, voltage gain, regulation, and efficiency of the implemented circuits.
CIUP322.5	Evaluate the performance of analog electronic circuits and justify suitable circuit configurations for IoT applications.

Course Name (Course Code): Digital Electronics Lab (CIUP323)

CO	Course Outcomes
CIUP323.1	**Implement** basic logic gates using universal gates on a breadboard.
CIUP323.2	**Simulate** the functionality of digital circuits using VHDL.
CIUP323.3	**Analyze** various combinational logic circuits (e.g., adders, multiplexers, parity generators) based on boolean expressions in SOP/POS form.
CIUP323.4	**Test** the sequential circuits (e.g., flip-flops, counters, shift registers) using the logic gate ICs.
CIUP323.5	**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 (CIUT-330)

CO	Course Outcomes
CIUT330.1	Interpret fundamental project requirement analysis and make comprehensive use of acquired technical knowledge during the training, to understand industrial processes.
CIUT330.2	Apply theoretical knowledge acquired in academic courses to solve practical problems encountered in real - world scenarios.
CIUT330.3	Demonstrate professional ethics, teamwork, communication, and continuous learning behaviour in the work environment through a compelling presentation that effectively conveys complex information.
CIUT330.4	Analyze user requirements, data flow, or system performance to identify and propose possible improvements.
CIUT330.5	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 (CIUA300)

CO	Course Outcomes
CIUA300.1	Understand the importance of adhering to institutional rules and norms, showcasing respectful and disciplined behaviour in their academic interactions.
CIUA300.2	Demonstrate the ability to leverage technology platforms while integrating technical expertise with project management, effectively balancing technical and resource needs in organizing projects.
CIUA300.3	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.
CIUA300.4	Develop a sense of responsibility toward community service and actively engage in social outreach programs, contributing positively to societal needs.
CIUA300.5	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

Semester: V Lab

Course Name (Course Code): Embedded System Design Lab (CIUP520)

CO	Course Outcomes
CIUP520.1	**Understand** the hardware components, architectural features, and testing kit of the 8051 microcontroller
CIUP520.2	**Apply** 'C' programming concepts to interface and manipulate basic I/O blocks like LEDs, switches, and 7-segment displays using software delays and built-in timers
CIUP520.3	**Implement** programs to interface alpha-numeric LCDs to scroll textual information and track state changes dynamically
CIUP520.4	**Analyze** data conversion systems by interfacing Analog-to-Digital Converters (ADC), Digital-to-Analog Converters (DAC), and temperature sensors to format and display real-world parameters
CIUP520.5	**Design** the control logic to interface peripherals like stepper motors for directional control using the microcontroller kit

Course Name (Course Code): Machine Learning Lab (CIUP521)

CO	Course Outcomes
CIUP521.1	**Implement** appropriate data preprocessing techniques using standard datasets.
CIUP521.2	**Examine** supervised machine learning algorithms for solving classification and prediction problems.
CIUP521.3`	**Compare** unsupervised learning techniques for discovering hidden patterns in datasets.
CIUP521.4	**Analyze** machine learning models using feature processing and validation techniques to improve prediction accuracy.
CIUP521.5	**Design** machine learning-based solutions for real-world engineering applications.

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Course Name (Course Code): Compiler Design Lab (CIUP522)

CO	Course Outcomes
CIUP522.1	***Apply*** various functions of lexical analyzer.
CIUP522.2	***Demonstrate*** the use of lex tool to identify patterns, tokens, and regular expressions for lexical analysis
CIUP522.3	Analyze symbol table management techniques for inserting, deleting, and displaying symbol table entries.
CIUP522.4	***Assess*** the implementation of YACC programs to recognize complex string patterns.
CIUP522.5	***Assess*** the implementation of YACC programs to compute arithmetic expressions

Course Name (Course Code): Programming for Problem Solving-I (CIUP523)

CO	Course Outcomes
CIUP523.1	**Apply** programming fundamentals, arrays, strings, and recursion to solve computational problems efficiently.
CIUP523.2	**Use** linear data structures such as linked lists, stacks, and queues to solve real-world programming problems.
CIUP523.3	**Illustrate** the process of efficient algorithm design using searching, sorting, hashing, trees, and heap-based data structures.
CIUP523.4	**Recommend** algorithms by considering paradigms like recursion, backtracking, greedy methods, and graph traversal techniques (BFS/DFS) to solve complex programming problems.
CIUP523.5	**Develop** programming solutions using programming fundamentals, arrays, strings, and recursion for efficient problem solving.

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Course Name (Course Code): Industrial Training (CIUT530)

CO	Course Outcomes
CIUT530-.1	Interpret fundamental project requirement analysis and make comprehensive use of acquired technical knowledge during the training, to understand industrial processes.
CIUT530-.2	Apply theoretical knowledge acquired in academic courses to solve practical problems encountered in real - world scenarios.
CIUT530-.3	Demonstrate professional ethics, teamwork, communication, and continuous learning behaviour in the work environment through a compelling presentation that effectively conveys complex information.
CIUT530-.4	Analyze user requirements, data flow, or system performance to identify and propose possible improvements.
CIUT530-.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 (CIUA500)

CO	Course Outcomes
CIUA500.1	Understand the importance of adhering to institutional rules and norms, showcasing respectful and disciplined behaviour in their academic interactions.
CIUA500.2	Demonstrate the ability to leverage technology platforms while integrating technical expertise with project management, effectively balancing technical and resource needs in organizing projects.
CIUA500.3	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.
CIUA500.4	Develop a sense of responsibility toward community service and actively engage in social outreach programs, contributing positively to societal needs.
CIUA500.5	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

Course Name (Course Code): Fundamentals of Data Science Lab (7CIT4-21)

CO	Course Outcome
7CIT4-21.1	**Demonstrate** the installation and basic usage of R and RStudio, including execution of fundamental R commands and functions.
7CIT4-21.2	**Apply** descriptive statistical techniques and data visualizations using R and ggplot2.
7CIT4-21.3	**Analyze** datasets using K-Means clustering and Association Rule Mining techniques in R.
7CIT4-21.4	**Evaluate** predictive models using Linear Regression, Logistic Regression and Naïve Bayes classification techniques.
7CIT4-21.5	**Develop** Decision Tree models for solving real-world data science problems and communicate analytical results effectively.

Course Name (Course Code): Cyber Security Lab (7CIT4-22)

CO	Outcomes
7CIT4-22.1	Apply the cryptographic algorithms for data communication.
7CIT4-22.2	Apply different types of attacks on various cryptographic algorithms.
7CIT4-22.3	Apply the Digital signature for secure data transmission and secure data storage.
7CIT4-22.4	Analyze the different open-source tools for network security and analysis.
7CIT4-22.5	Develop a Secure Architecture for small enterprise.

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Course Name (Course Code): Seminar (7CIT4-40)

CO	Course Outcomes
7CIT4-40.1	**Identify** the topic in an emerging area and the relevant background literature.
7CIT4-40.2	**Analyze** research papers and technical information to identify key concepts, methodologies, and recent developments in the chosen domain.
7CIT4-40.3	**Evaluate** the significance, limitations, and future scope of the selected technology based on critical analysis of the literature.
7CIT4-40.4	**Design** an effective technical seminar using appropriate presentation techniques.
7CIT4-40.5	**Prepare** a well-structured technical seminar report and presentation by organizing and synthesizing information from authentic sources.

Course Name (Course Code): SODECA (7CIT8-00)

CO	Course Outcomes
7CIT8-00.1	Understand the importance of adhering to institutional rules and norms, showcasing respectful and disciplined behaviour in their academic interactions.
7CIT8-00.2	Demonstrate the ability to leverage technology platforms while integrating technical expertise with project management, effectively balancing technical and resource needs in organizing projects.
7CIT8-00.3	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.
7CIT8-00.4	Develop a sense of responsibility toward community service and actively engage in social outreach programs, contributing positively to societal needs.
7CIT8-00.5	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.