DEPARTMENT OF COMPUTER SCIENCE AND BUSINESS SYSTEMS COURSE OUTCOMES (REGULATION 2021)

SEMESTER III

Course Code / Course Name: MA3354 / Discrete Mathematics

CO No.	Course Outcomes (COs)
C201.1	Apply the principles of logic and proof techniques to validate Mathematical statements.
C201.2	Analyze the combinatorial problems using counting techniques, recurrence relations and generating functions.
C201.3	Analyze graph-based models for real-world problems using graph theory concepts.
C201.4	Apply the properties of groups, rings and fields to address and solve mathematical problems.
C201.5	Evaluate logical expressions and Boolean functions using lattice theory and Boolean algebra for digital logic applications.

.**Course Code / Course Name:** CS3351 / Digital Principles and Computer Organization

CO No.	Course Outcomes (COs)
C202.1	Design various combinational digital circuits using logic gates
C202.2	Design sequential circuits and analyze the design procedures
C202.3	State the fundamentals of computer systems and analyze the execution of an instruction
C202.4	Analyze different types of control design and identify hazards
C202.5	Identify the characteristics of various memory systems and I/O communication

Course Code/ Course Name: CW3301/Fundamentals of Economics

CO No.	Course Outcomes (COs)
C203.1	Explain the supporting of price, income and substitution effects in the consumers and producers surplus
C203.2	Compare the equilibrium of a firm under perfect competition, monopoly and monopolistic competition
C203.3	Apply the concepts of demand for money and supply of money with appropriate model in macro-economic analysis
C203.4	Analyse the economic models in domestic and global contexts for individual decision making.
C203.5	Examine and evaluate the problems of voluntary and in voluntary unemployment.

Course Code / Course Name: CS3391 / Object Oriented Programming

CO No.	Course Outcomes (COs)
C204.1	Understand object-oriented programming concepts by designing and implementing solutions using classes and objects for simple problems.
C204.2	Develop modular Java applications by utilizing inheritance, packages, and interfaces to promote reusability and maintainability.
C204.3	Apply exception handling and multithreading to solve real-world problems involving concurrent execution and error management.
C204.4	Discuss efficient Java programs using I/O operations, string manipulation, collections, and generics for data processing and management.
C204.5	Apply event handling mechanisms and JavaFX components to create interactive and user-friendly GUI-based applications.

Course Code/Course Name: AD3351 / Design and Analysis of Algorithms

CO No.	Course Outcomes (COs)
C205.1	Critically analyze the efficiency of alternative algorithmic solutions for the same problem
C205.2	Illustrate brute force and divide and conquer design techniques.
C205.3	Explain dynamic programming and greedy techniques for solving various problems.
C205.4	Apply iterative improvement technique to solve optimization problemA
C205.5	Examine the limitations of algorithmic power and handling it in different problems.

Course Code/ Course Name: AD3491 / Fundamentals of Data Science and Analytics

CO No.	Course Outcomes (COs)
C206.1	Explain the data analytics pipeline to understand the sequential stages of data processing to optimize workflows for better insights.
C206.2	Describe and visualize data to uncover patterns and trends effectively to make complex information more comprehensible
C206.3	Perform statistical inferences from data to draw meaningful conclusions to support decision-making under uncertainty.
C206.4	Analyze the variance in the data to identify sources of variability in the data to assess its impact on outcomes.
C206.5	Build models for predictive analytics to forecast future trends and behaviors for predictive analytics to make data-driven predictions.

Course Code/ Course Name: CW3311/Business Communication Laboratory I

CO No.	Course Outcomes (COs)
C207.1	Speak fluently in English without errors and present themselves as effective communicators.
C207.2	Use business vocabulary and take part comfortably in business conversations in English.
C207.3	Draft letters and reports with appropriate formats and choice of words

C207.4	Perform well in team and group, resolve conflicts in workplaces and acquire leadership skills.
C207.5	Understand women in all spheres and cultural behaviors of the people and approach them with positive human values.

Course Code / Course Name: CS3381 / Object Oriented Programming Laboratory

CO No.	Course Outcomes (COs)
C208.1	Design and develop Java programs using object-oriented programming concepts.
C208.2	Develop simple applications using object oriented concepts such as package, exceptions.
C208.3	Implement multithreading and generics concepts.
C208.4	Create GUIs and event driven programming applications for real world problems.
C208.5	Implement and deploy web applications using Java.

Course Code / Course Name: GE3361 / Professional Development

CO No.	Course Outcomes (COs)
C209.1	Create well-structured and formatted documents using MS Word for academic and technical purposes.
C209.2	Apply advanced formatting tools in MS Word to organize content using tables, styles, headers/footers, and references.
C209.3	Use MS Excel to perform data entry, manipulation, and basic calculations using formulas and functions.
C209.4	Analyze and visualize data in MS Excel using charts, graphs, pivot tables, and conditional formatting for effective decision-making.
C209.5	Design engaging academic presentations using MS PowerPoint by integrating tables, charts, media, and hyperlinks

SEMESTER IV

Course Code / Course Name: MA3391 / Probability and Statistics

CO No.	Course Outcomes (COs)
C210.1	Understand the fundamental knowledge of the concepts of probability to analyze uncertainty in real-world problems.
C210.2	Relate the concepts of one and two-dimensional random variables to model relationships in datasets.
C210.3	Demonstrate testing of hypothesis for small and large samples to solve real-life challenges.
C210.4	Apply the basic concepts of classifications of design of experiments to improve processes in agriculture.
C210.5	Interpret the concept of sampling, apply appropriate sampling methods, and analyze the resulting data to draw meaningful insights from a population.

Course Code / Course Name: CS3492 / Database Management Systems

CO No.	Course Outcomes (COs)
C211.1	Understand relational database model with database system architecture and construct SQL Queries using relational algebra.
C211.2	Create a database design using Entity Relationship model and decompose the database using normalization.
C211.3	Construct queries to handle transaction processing and maintain consistency of the database using concurrency control
C211.4	Compare and contrast various indexing strategies and apply query optimization techniques to tune the performance of the database.
C211.5	Understand how advanced distributed databases differ from Relational Databases and construct different NoSQL databases with enhanced security.

Course Code/ Course Name: AL3452 /Operating Systems

CO No.	Course Outcomes (COs)
C212.1	Analyze various scheduling algorithms and process synchronization to optimize CPU utilization.
C212.2	Explain deadlock, prevention, and avoidance algorithms to understand system reliability.
C212.3	Compare and contrast various memory management schemes to evaluate their efficiency.
C212.4	Demonstrate the functionality of file systems, I/O systems, and virtualization to understand storage and processing mechanisms.
C212.5	Compare iOS and Android operating systems to identify their unique features.

Course Code/ Course Name: CW3401/Introduction to Business Systems

CO No.	Course Outcomes (COs)
C213.1	Define the core concepts terminology and principles of business systems including the role of information systems in business operations and decision making process
C213.2	Explain the significance and purpose of business systems in various organizational structure and describe the systems integrate with business function such as marketing, finance and operation.
C213.3	Apply the basic concept of business systems to real world business scenarios demonstrating how information system can be used stream line operation and enhance decision making process.
C213.4	Analyze the relationship between various types of business systems and evaluate their effectiveness in improving organizational efficiency and meeting business goals.
C213.5	Develop a basic business systems model integrating key concepts and technologies and proposing solutions to optimize business processes in hypothetical organization.

Course Code / Course Name: AL3451 / Machine Learning

CO No.	Course Outcomes (COs)
C214.1	Explain fundamental machine learning concepts, including hypothesis spaces, generalization, and bias-variance trade-off.
C214.2	Develop supervised learning models such as linear regression, SVM, decision trees, and probabilistic classifiers.
C214.3	Apply ensemble techniques like bagging, boosting, and stacking, along with unsupervised learning methods like K-means and GMM.
C214.4	Develop and optimize neural networks, addressing challenges like vanishing gradients and hyper parameter tuning.
C214.5	Analyze machine learning experiments using cross-validation, performance metrics, and statistical tests.

Course Code / Course Name: GE3451 / Environmental Sciences and Sustainability

CO No.	Course Outcomes (COs)
C215.1	Understand the Concept of Environment and bio diversity, duty of individual in conservation of environment and bio diversity.
C215.2	Create Awareness on Environmental Pollution, its causes, effects and control, management of natural disasters.
C215.3	Understand energy management and conservation and also the importance of new sources of energy.
C215.4	Understand the sustainability and management process and analyse climate changes, concept of carbon credit and the challenges of environmental management.
C215.5	Analyse the role of sustainable urbanization and to understand green materials, energy cycles and explain the rules and regulation of Sustainability practices

Course Code /Course Name: CS3481/ Database Management Systems Laboratory

CO No.	Course Outcomes (COs)
C216.1	Implement SQL queries using typical data definition language and data manipulation language with different types of Key constraints in relational database management system
C216.2	Construct SQL queries using where clause and perform different join operations, apply Data Control Language for complex transactions.
C216.3	Apply advanced features of PL/SQL such as stored procedures and triggers, incorporate in GUI based application development.
C216.4	Apply view, index for an SQL database and Create an web application to retrieve data from XML database with XML Schema Validation.
C216.5	Create and manipulate NoSQL database to perform CRUD operations, apply the database design for a real time application.

Course Code/ Course Name: AD3461 / Machine Learning Laboratory

CO No.	Course Outcomes (COs)
C217.1	Apply suitable algorithms for selecting the appropriate features for analysis to improve model performance.

C217.2	Implement supervised machine learning algorithms on standard datasets and evaluate the performance to solve classification and regression problems.

C217.3	Demonstrate unsupervised machine learning algorithms on standard datasets and evaluate the performance to discover hidden patterns in data.
C217.4	Build graph-based learning models for standard datasets to capture relationships and dependencies in data.
C217.5	Assess and compare the performance of different ML algorithms and select the suitable one based on the application to optimize model selection.

Course Code/ Course Name: CW3311/Business Communication Laboratory II

CO No.	Course Outcomes (COs)
C218.1	Apply fluency in English by constructing error-free sentences and demonstrate effective communication skills.
C218.2	Analyze the distinction between adjectives and verbs in vocabulary usage and construct grammatically correct sentence structures.
C218.3	Deliver public speeches tailored to audience needs and demonstrate appropriate body language for effective communication.
C218.4	Evaluate essential aspects of teamwork, including motivation, multicultural collaboration, and conflict resolution.
C218.5	Implement ethical principles, professional responsibilities, and social platform strategies to develop leadership skills for workplace success.

SEMESTERV

Course Code / Course Name: CS3691 / Embedded Systems and IoT

CO No.	Course Outcomes (COs)
C301.1	Analyze the architecture, instruction set and programming of embedded processors.
C301.2	Apply the concept of embedded C programming in embedded system devices and understand the operating system concepts, types and choosing RTOS
C301.3	Understand the basic components and building blocks of Internet of Things and apply skills to conduct interfacing of arduino boards with embedded components.
C301.4	Understand the characteristics and high level requirements to design new IoT devices and summarize different communication technologies and protoclols of IoT.
C301.5	Implement real field problem by gained knowledge of Embedded Systems with IoT applications using Arduino/Raspberry Pi /open platform.

Course Code/Course Name: CW3501 /Fundamentals of Management

CO No.	Course Outcomes (COs)

C302.1	Understand the key elements of effective management and apply them in organizational contexts.
C302.2	Apply planning and decision-making concepts to organizational problems and evaluate outcomes.
C302.3	Describe organizational concepts and analyze the staffing process and its importance.
C302.4	Adopt directing strategies through motivation and leadership to influence team performance.
C302.5	Demonstrate the use of control methods to manage changes in the business environment effectively.

Course Code / Course Name: CW3551 / Data and Information Security

CO No.	Course Outcomes (COs)
C303.1	Understand the foundational concepts of data and information security and protection mechanisms in information systems.
C303.2	Apply ethical decision-making frameworks to address challenges and ensure compliance in real-world scenarios.
C303.3	Apply various authentication schemes to simulate different applications and their effectiveness in securing systems.
C303.4	Evaluate Electronic mail security and IP Security System Standards in various environments.
C303.5	Develop web security protocols, effectiveness in securing ecommerce applications and ensuring safe transactions over the internet.

Course Code/Course Name: CCS335/Cloud Computing (Professional Elective I)

CO No.	Course Outcomes (COs)
C304.1	Define the design challenges in cloud computing and explain their impact on system architecture.
C304.2	Apply the concept of virtualization and analyze its different types for cloud deployment.
C304.3	Experiment with the virtualization of hardware resources and use Docker for containerization.
C304.4	Develop and deploy services on the cloud and set up a cloud computing environment.
C304.5	Explain the security challenges in the cloud environment and propose solutions to mitigate risks.

Course Code / Course Name: CCS341/Data Warehousing (Professional Elective II)

CO No.	Course Outcomes (COs)
C305.1	Describe the core concepts and architecture of data warehouse with operational and analytical systems.
C305.2	Design data warehouse schemas using star and snowflake models and organize data into fact and dimension tables.
C305.3	Explain the ETL process and its significance in data integration using data transformation techniques to clean and load data.
C305.4	Examine OLAP procedures including drill-down, roll-up, and slicing using various OLAP models, including ROLAP, MOLAP, and HOLAP.
C305.5	Evaluate the functions of system and process managers in data warehouse environments and their contribution to performance tuning and query optimization.

Course Code / Course Name: MX3084/ Disaster Risk Reduction and Management

CO No.	Course Outcomes (COs)
C306.1	Identify and recall definitions and key components of disasters, vulnerability, and disaster risk reduction.
C306.2	Describe hazards, vulnerability factors, and the principles of disaster risk assessment.
C306.3	Utilize specific tools and technologies for effective disaster response.
C306.4	Outline the institutional disaster response frameworks in place within the country.
C306.5	Demonstrate basic disaster response techniques in simulations or controlled environments.

Course Code/Course Name: AD3512 / Summer internship

CO No.	Course Outcomes (COs)
C307.1	Understand industry practices, processes, and technologies in software development, and apply automation techniques.
C307.2	Analyze complex business problems and design effective solutions using appropriate methodologies.
C307.3	Develop and deploy solutions on the target platform, ensuring functionality and scalability.
C307.4	Prepare technical reports and deliver presentations to communicate project outcomes effectively.
C307.5	Evaluate the impact of implemented solutions and reflect on their alignment with industry standards.

SEMESTERVI

Course Code/Course Name: CW3601/Business Analytics

CO No.	Course Outcomes (COs)
C308.1	Explain the stages of the analytics life cycle and apply them to define, analyze, and solve business problems using data-driven approaches.
C308.2	Use Business Intelligence (BI) tools and techniques, including OLAP and decision support systems, to generate actionable insights for decision-making.
C308.3	Apply predictive analytics and machine learning models to forecast business trends and support data-driven decision-making.
C308.4	Analyze and optimize supply chain and HR functions using analytics techniques for demand planning, inventory management, and workforce prediction.
C308.5	Design and implement data-driven solutions for real-world business challenges across various functional areas.

Course Code / Course Name: CCS356/ Object Oriented Software Engineering

CO No.	Course Outcomes (COs)
C309.1	Understand the requirements for a given software system and document them in a Software Requirements Specification (SRS).
C309.2	Apply various use case models, Domain Models, and UML diagrams for the identified software system.
C309.3	Relate various design patterns like Model-view-controller, Publish- Subscribe models based on the detailed design specifications.
C309.4	Analyze test cases to validate the functionality of the implemented system based on the defined use cases.
C309.5	Develop software maintainability and reusability by incorporating suitable design patterns and implementing the system to enhance efficiency.

Course Code/Course Name: OCE351/Environmental and Social Impact Assessment (Open Elective–I*)

CO No.	Course Outcomes (COs)
C310.1	Understand the basic concept of Environmental impact assessment, Flow of EIA, EIA Product and Process, Step wise structure of EIA, types of environmental impacts, significance and criteria for selection of EIA consultant.
C310.2	Select methodology for identification of environmental impacts, environmental indices and indicators
C310.3	Apply the knowledge of predicting impact of proposed project on air, water, land, energy, flora and fauna and Acquire the skills of preparing environment management plans and EIA report
C310.4	Acquire knowledge of predicting impact of proposed project on Socio-economic conditions and Ability to evaluate environmental impact assessment report.
C310.5	Acquire knowledge of obtaining EC from central Government for proposed project by analyzing the case studies of different projects.

Course Code / Course Name: CCS345/ Ethics and AI (Professional Elective III)

CO No.	Course Outcomes (COs)
C311.1	Understand and learn the principles of morality and ethics in AI, applying ethical frameworks to assess AI behavior and decision-making processes.
C311.2	Find the ethical harms that can arise in AI systems, apply ethical initiatives to mitigate risks and promote responsible AI development.
C311.3	Make use of AI standards and regulations to ensure safe design practices for autonomous and semi-autonomous systems in real-world applications.
C311.4	Demonstrate the concepts of Roboethics and the morality of robotic systems to evaluate the professional responsibilities involved in designing and deploying robots.
C311.5	Survey the societal issues in AI, applying national and international strategies to address challenges and promote the responsible use of AI technologies worldwide.

Course Code / Course Name: CCS336 /Cloud Service Management (Professional Elective IV)

CO No.	Course Outcomes (COs)
C312.1	Understand the fundamental concepts of cloud ecosystems, service models, deployment models, and IT service management perspectives.
C312.2	Apply cloud strategy frameworks and IT capacity planning techniques to implement demand–capacity matching, risk mitigation, and change management.
C312.3	Analyze the cloud service lifecycle and reference models to manage operations, capacity, and migration of legacy systems.
C312.4	Evaluate cloud pricing models, cost structures, and economic implications to support optimized decision-making for procurement and operations.
C312.5	Design a cloud governance framework and recommend an optimized multi-cloud deployment strategy based on service value and total cost of ownership.

Course Code / Course Name: CCS359/ Quantum Computing (Professional Elective V)

CO No.	Course Outcomes (COs)
C313.1	Relate the fundamental principles of quantum computing to understand quantum algorithms and computations.
C313.2	Explore the principles of quantum mechanics, such as wave-particle duality and uncertainty that form the foundation of quantum computing t.
C313.3	Differentiate various quantum computation models, such as quantum circuits and quantum Turing machines with their applications.
C313.4	Build quantum circuits using quantum computation environments like Qiskit and Cirq frameworks for practical quantum computing.
C313.5	Identify quantum operations, including the effects of noise on quantum systems and methods for error correction to confirm reliable quantum computations.

Course Code / Course Name: CCS361/ Robotic Process Automation

CO No.	Course Outcomes (COs)
C314.1	Explain the fundamentals, evolution, components, platforms, and benefits of Robotic Process Automation (RPA) and distinguish RPA from traditional automation techniques.
C314.2	Design and implement automation workflows using sequencing, flowcharts, control flows, data manipulation techniques, and UI control handling activities.
C314.3	Integrate applications and develop automated solutions using recording, selectors, web scraping, workflow activities, and process mining techniques.
C314.4	Apply exception handling, logging, debugging, and code management practices to build robust, reusable, and maintainable RPA solutions.
C314.5	Demonstrate the ability to deploy, orchestrate, manage, and maintain RPA bots, evaluate RPA vendors, and analyze the future scope of RPA technologies.

Course Code / Course Name: CW3611 - Business Analytics Laboratory

CO No.	Course Outcomes (COs)
C315.1	Implement machine learning algorithms to perform predictive analytics and solve real-world business problems using datasets.
C315.2	Use linear regression to analyze credit card data and predict customer credit risk, demonstrating statistical modeling skills.
C315.3	Apply HR analytics to predict hourly employee demand, utilizing time-series forecasting and workforce planning techniques.

C315.4	Use analytics to forecast demand and optimize inventory planning for retailers, ensuring efficient supply chain management.
C315.5	Perform predictive analytics on customer behavior datasets to identify trends and support data-driven marketing strategies.

Course Code / Course Name: MX3085 / Well-Being with Traditional Practices-Yoga, Ayurveda and Siddha

CO No.	Course Outcomes (COs)
C316.1	Interpret importance of maintain health and diseases with environment and illustrate different types of health with risk factors.
C316.2	Importance of Diet in maintaining health and role of necessary seven different components in diet.
C316.3	Formulate secrets of siddha and Ayurveda systems and specific production of body from illness by Ayush.
C316.4	Recognize physiological response of people, import the maintenances of emotional disturbances and practices self compassion.
C316.5	Categorize types of yoga and choose right kind for individuals based on age and demonstrate simple Yogassana.

SEMESTER VII

Course Code / Course Name: GE3791 / Human Values and Ethics

CO No.	Course Outcomes (COs)
C401.1	Explain the impact of the French Revolution, American Independence, and the Indian Freedom Movement on the development and implementation of democratic values.
C401.2	Apply secular principles to contemporary issues of religious tolerance and discrimination, proposing practical solutions based on secular values.
C401.3	Analyze the role of evidence-based approaches in validating facts and developing scientific knowledge.
C401.4	Assess the role of inclusive practices in promoting social equity, justice and promote gender equality.
C401.5	Propose ethical guidelines for responsible scientific research, innovation and frameworks for ensuring fairness and accountability in scientific advancements.

Course Code / Course Name: GE3751/ Principles of Management (Elective- Management)

CO No.	Course Outcomes (COs)
C402.1	Understand the concepts of management fundamentals, Business organizations and its types and also current trends in management
C402.2	Discuss the nature and purpose of planning in management and also describe various types of planning and tools.
C402.3	Summarize the concepts of organizational structure, authority, job design, and human resource management, including planning, recruitment, training, and performance evaluation.
C402.4	Explain the foundations of individual and group behavior, motivation, leadership theories, and communication processes, including barriers and the role of IT in effective communication.
C402.5	Elaborate the system and process of managerial control, including various control techniques, the role of IT in control, and the relationship between control, productivity, and performance

Course Code / Course Name: AI3021 / IT in Agricultural System (Open Elective–II*)

CO No.	Course Outcomes (COs)
C403.1	Gain foundational knowledge of agricultural processes and how automation techniques can enhance productivity and efficiency in farming.
C403.2	Understand practical farming techniques and methodologies that support continuous learning and adaptation in agricultural practices.
C403.3	Learn about various sensors and automation tools used in agriculture to monitor and optimize farming operations.
C403.4	Grasp the concepts of climate variability, weather forecasting, and how global models and seasonal applications impact agricultural planning and decision-making.

C403.5	Explore the role of expert systems, e-commerce platforms, and agricultural databases in modern farming. Additionally, the course will cover how technology can support rural development and e-learning initiatives in agriculture.

Course Code / Course Name: OHS351 / English for Competitive ((Open Elective–III*)

CO No.	Course Outcomes (COs)
C404.1	Expand vocabulary and apply practical techniques to read and comprehend a wide range of texts with the appropriate emphasis required for academic and professional contexts.
C404.2	Identify and correct errors in writing with precision, while ensuring clarity and coherence in the expression of ideas.
C404.3	Understand the importance of task fulfillment and utilize task-appropriate vocabulary to enhance written and spoken communication.
C404.4	Communicate effectively in group discussions, presentations, and interviews by practicing active listening, clear articulation, and engaging with others' ideas.
C404.5	Write topic-based essays with precision and accuracy, focusing on developing well- structured arguments and clear, concise writing.

Course Code / Course Name: OHS352 / Project Report Writing (Open Elective–IV*)

CO No.	Course Outcomes (COs)
C405.1	Apply essential grammar and vocabulary for formal writing, distinguishing between technical and general writing styles.
C405.2	Analyze the structure, types, and purpose of reports, and apply knowledge of plagiarism and data analysis in STEM-related writing.
C405.3	Construct the initial sections of a project report including title, abstract, introduction, research questions, and theoretical framework.
C405.4	Develop comprehensive research content including literature review, methodology, data analysis, findings, and conclusions.
C405.5	Demonstrate effective proofreading, formatting, and oral presentation skills to deliver a professional project report.

SEMESTER VIII

CO No.	Course Outcomes (COs)
C406.1	Understand concepts of Project and Production Management
C406.2	Get capable of self-education and clearly understand the value of achieving perfection in project implementation & completion.
C406.3	Apply the theoretical concepts to solve industrial problems with teamwork and multidisciplinary approach
C406.4	Make sound decisions, to progress and develop time and resource management skills to complete the project successfully.
C406.5	Deliver presentations that are required as engineers.