Department of CSE [Artificial Intelligence & Machine Learning]

R22 COURSE OUTCOMES

Semester No:	1		
Course Title:	Matrices and Calculus	**Course Code:**	C101
Course Outcome No.	**Course Outcome Statement**		
C101.1	Use the matrix representation of a set of linear equations and analyze the solution of the system of equations.		
C101.2	Find the Eigen values and Eigenvectors and reduce the quadratic form to canonical form using orthogonal transformation.		
C101.3	Solve the applications on the mean value theorems and evaluate the improper integrals using Beta and Gamma functions.		
C101.4	Apply the extreme values of functions of two variables with/ without constraints.		
C1015	Compute multiple integrals and apply the concept to find areas, volumes.		

Semester No:	1		
Course Title:	Applied Physics	**Course Code:**	C102
Course Outcome No.	**Course Outcome Statement**		
C102.1	Understand physical world from fundamental point of view by the concepts of Quantum mechanics and visualize the difference between conductor, semiconductor, and an insulator by classification of solids.		
C102.2	Identify the role of semiconductor devices in science and engineering Applications.		
C102.3	Explore the fundamental properties of dielectric and magnetic materials for their applications.		
C102.4	Interpret the features and applications of nanomaterials.		
C102.5	Relate various aspects of Lasers and Optical fibres and their applications in diverse fields		

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Semester No:	1		
Course Title:	Programming for Problem Solving	**Course Code:**	C103
Course Outcome No.	**Course Outcome Statement**		
C103.1	Illustrate and explain the basic computer concepts, algorithms, flowcharts and programming principles of C Language.		
C103.2	Develop C programs to solve simple mathematical and decision making problems.		
C103.3	Understand, distinguish and implement arrays, strings and structures to write C programs.		
C103.4	Understand the concepts of pointers and files using C programs.		
C103.5	Decompose a problem into functions and to develop modular reusable code.		
C103.6	Understand the Searching and sorting problems		

Semester No:	1		
Course Title:	English for Skill Enhancement	**Course Code:**	C104
Course Outcome No.	**Course Outcome Statement**		
C104.1	Understand the importance of vocabulary and sentence structures.		
C104.2	Demonstrate their understanding of the rules of functional grammar		
C104.3	Take an active part in drafting paragraphs, letters, essays, abstracts, precise and reports in various contexts.		
C104.4	Develop comprehension skills from the known and unknown passages.		
C104.5	Acquire basic proficiency in reading and writing modules of English.		

Semester No:	1		
Course Title:	IT Workshop	**Course Code:**	C105
Course Outcome No.	**Course Outcome Statement**		
C105.1	Apply knowledge for PC hardware and computer parts..		
C105.2	Apply knowledge for computer assembling and software installation.		
C105.3	Ability how to solve the trouble shooting problems.		
C105.4	Apply the tools for preparation of project certificate, Creating a Newsletter.		
C105.5	Apply the tools for preparation of PPT, Documentation and budget sheet etc.		

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Semester No:	1		
Course Title:	Applied Physics Laboratory	**Course Code:**	C106
Course Outcome No.	**Course Outcome Statement**		
C106.1	Know the determination of the Planck's constant using Photoelectric effect.		
C106.2	Appreciate quantum physics in semiconductor devices, optoelectronics and identify the material whether it is n-type or p-type by Hall experiment.		
C106.3	Gain the knowledge of applications of dielectric constant and understand the variation of magnetic field and behavior of hysteresis curve.		
C106.4	Gain the knowledge of Characteristics of Laser and optical fiber measurements.		
C106.5	Carried out data analysis.		

Semester No:	1		
Course Title:	Programming for Problem Solving Laboratory	**Course Code:**	C107
Course Outcome No.	**Course Outcome Statement**		
C107.1	Develop C programs forsimple numerical problems.		
C107.2	Apply the knowledge of conditional statements and loops in programs.		
C107.3	Implement the programs using the concepts of arrays, structures, pointers and files.		
C107.4	Create the programs using functions and recursive functions.		
C107.5	Implement searching and sorting algorithms		

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Semester No:	1		
Course Title:	English Language and Communication Skills Laboratory	**Course Code:**	C108
Course Outcome No.	**Course Outcome Statement**		
C108.1	Pronounce English sounds according to standard pronunciation.		
C108.2	Understand the nuances of English language through audio- visual experience and practice.		
C108.3	Speak with clarity and confidence which in turn enhances their employability skills.		
C108.4	Neutralize their accent for intelligibility.		
C108.5	Participate in discussion and presentation effectively and confidently..		

Semester No:	1		
Course Title:	**Basic Elements of Engineering Technology**	**Course Code:**	C109
Course Outcome No.	**Course Outcome Statement**		
C109.1	Exploring different engineering technologies and their applications.		
C109.2	Students should able to learn various 3d printing technologies.		
C109.3	Knowledge towards Assembling and testingof robots.		
C109.4	Understanding functionality of 3Dprinters and their application.		
C109.5	Developing team work and in sight towards different disciplines of Engineering.		

Semester No:	2		
Course Title:	Ordinary Differential Equations and Vector Calculus	**Course Code:**	C110
Course Outcome No.	**Course Outcome Statement**		
C110.1	Identify whether the given differential equation of first order is exact or not.		
C110.2	Solve higher order differential equations.		
C110.3	Use Laplace transforms techniques to find the derivatives and integrals of given functions & inverse Laplace transforms techniques for solving ODE's.		
C110.4	Analyze vector and scalar point functions.		
C110.5	Evaluate the line and surface integrals and converting them from one to another.		

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Semester No:	2		
Course Title:	Engineering Chemistry	**Course Code:**	C111
Course Outcome No.	**Course Outcome Statement**		
C111.1	Identify the basic properties of water and its usage in domestic and industrial purposes.		
C111.2	Learn the fundamentals and general properties of polymers and other engineering materials. Apply in day to day life.		
C111.3	Make use of basic knowledge of electrochemical procedures related to corrosion and its control.		
C111.4	Interpret the concepts of petroleum products and cement, Smart materials.		
C111.5	Find potential applications of chemistry and practical utility in order to become good engineers and entrepreneurs.		

Semester No:	2		
Course Title:	Data Structures	**Course Code:**	C112
Course Outcome No.	**Course Outcome Statement**		
C112.1	Explain the basic concepts such as Abstract Data Types, Linear and Non-Linear Data structures.		
C112.2	Discuss hashing and different collision resolve techniques.		
C112.3	Design programs using a variety of data structures including binary search trees, heaps trees and AVL-trees.		
C112.4	Develop programs on sorting and graphs.		
C112.5	Apply different searching techniques on Non linear data structure		

Semester No:	2		
Course Title:	Basic Electrical and Electronics Engineering	**Course Code:**	C113
Course Outcome No.	**Course Outcome Statement**		
C113.1	Identify the basic DC electrical circuits.		
C113.2	Evaluate the basic single phase and three phase AC circuits.		
C113.3	Analyze the working principles of Electrical Machines.		
C113.4	Classify the concepts of diodes &Rectifiers.		
C113.5	Compare the knowledge of various transistor configurations, characteristics and applications.		

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Semester No:	2		
Course Title:	Computer Aided Engineering Graphics	**Course Code:**	C114
Course Outcome No.	**Course Outcome Statement**		
C114.1	Determination of parameters like hardness of water and rate of corrosion of mild steel in various conditions.		
C114.2	Perform methods such as conductometry and potentiometry in order to find out the concentration equivalence points of acids and bases.		
C114.3	Prepare polymers like bakelite and nylon-6.6		
C114.4	Evaluate and interpret engineering drawings for development of surfaces to Right Regular Solids- prism, manually and by using computer aided drafting tool.		
C114.5	Change the conversion of orthographic projection into isometric view and vice versa manually and by using computer aided drafting tool.		

Semester No:	2		
Course Title:	Engineering Chemistry Laboratory	**Course Code:**	C115
Course Outcome No.	**Course Outcome Statement**		
C115.1	Determination of parameters like hardness of water and rate of corrosion of mild steel in various conditions.		
C115.2	Perform methods such as conductometry and potentiometry in order to find out the concentration equivalence points of acids and bases.		
C115.3	Prepare polymers like bakelite and nylon-6.6		
C115.4	Estimations of saponification value, surface tension and viscosity of lubricant oils.		
C115.5	Find the rate of corrosion ofmild steel in various conditions.		

Semester No:	2		
Course Title:	Data Structures Laboratory	**Course Code:**	C116
Course Outcome No.	**Course Outcome Statement**		
C116.1	Implement various linear data structures.		
C116.2	Implement various nonlinear data structures.		
C116.3	Compare various searching and sorting algorithms.		
C116.4	Ability to implement trees and graphs traversals.		
C116.5	Understanding of searching algorithms		

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Semester No:	2		
Course Title:	Basic Electrical and Electronics Engineering Laboratory	**Course Code:**	C117
Course Outcome No.	**Course Outcome Statement**		
C117.1	Verify the Ohms law, KCL, KVL with practical approach.		
C117.2	Estimate the performance calculations ofsingle phase transformers.		
C117.3	Analyze the Performance characteristics of DC and AC machines through various testing methods.		
C117.4	Compare the characteristics of different types of diodes and transistors.		
C117.5	Evaluate the performance of Rectifiers with and without filters.		

Semester No:	2		
Course Title:	Environmental Science	**Course Code:**	C118
Course Outcome No.	**Course Outcome Statement**		
C118.1	Appreciate concepts and methods from ecological and physical sciences and their application in environmental problem solving.		
C118.2	Analyze and synthesize scientific data to characterize and evaluate the status of at least one type of ecological system and apply skills of measurement, spatial orientation, sampling, and data analysis to characterize natural resource phenomena.		
C118.3	Create awareness on the basic philosophy of science, concepts and scope.		
C118.4	Evaluate consequences of human exposure to pollution and its impacts to environmental quality.		
C118.5	Comprehending the statutory and regulatory mechanisms pertaining to environment in India and understanding judicial response to environmental issues in India.		

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II YEAR

Semester No:	3		
Course Title:	Discrete Mathematics	**Course Code:**	C201
Course Outcome No.	**Course Outcome Statement**		
C201.1	Construct precise mathematical proofs.		
C201.2	Use logic and set theory to formulate precise statements.		
C201.3	Apply algebraic structures and Boolean algebra		
C201.4	Solve combinatorial counting problems.		
C201.5	Apply graph theory in solving computing problems.		

Semester No:	3		
Course Title:	Software Engineering	**Course Code:**	C202
Course Outcome No.	**Course Outcome Statement**		
C202.1	Apply software development life cycle principles and process models to structure software projects.		
C202.2	Construct the software requirements specifications with relevant use-cases.		
C202.3	Analyze the project management strategies and various components to build the architecture using suitable design strategies.		
C202.4	Estimate the best coding standards and testing strategies to develop high quality software products.		
C202.5	Design metrics for process and products with the help of risk and quality management		

Semester No:	3		
Course Title:	Programming with Python	**Course Code:**	C203
Course Outcome No.	**Course Outcome Statement**		
C203.1	Examine Python syntax and semantics, flow control.		
C203.2	Demonstrate proficiency in handling Strings and Arrays.		
C203.3	Apply Python Programs using core data structures like Lists, Dictionaries.		
C203.4	Conduct experiments on file handling, exception handling, and modules.		
C203.5	Interpret the concepts of Object-Oriented Programming as used in Python.		

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Semester No:	3		
Course Title:	Computer Organization and Architecture	**Course Code:**	C204
Course Outcome No.	**Course Outcome Statement**		
C204.1	Identity of computer organization architecture.		
C204.2	Analyze the basics of instruction sets and their functionality.		
C204.3	Evaluate arithmetical operations by using data.		
C204.4	Demonstrate the functional units of the computer.		
C204.5	Design a pipeline for consistent execution of instructions.		

Semester No:	3		
Course Title:	Operating Systems	**Course Code:**	C205
Course Outcome No.	**Course Outcome Statement**		
C205.1	Demonstrate the basic concepts of Operating Systems.		
C205.2	Implement various process scheduling algorithms and deadlock techniques.		
C205.3	Examine various process management concepts and IPC.		
C205.4	Apply memory management strategies and page replacement algorithms.		
C205.5	Analyze file management and disk management aspects of operating systems		

Semester No:	3		
Course Title:	Python Lab	**Course Code:**	C206
Course Outcome No.	**Course Outcome Statement**		
C206.1	Apply basic Python syntax and control structures.		
C206.2	Develop programs using functions and data structures.		
C206.3	Implement file handling and exception handling.		
C206.4	Apply object-oriented programming concepts.		
C206.5	Develop applications using modules, GUI, and scientific libraries.		

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Semester No:	3		
Course Title:	Software Engineering Lab	**Course Code:**	C207
Course Outcome No.	**Course Outcome Statement**		
C207.1	Translate end-user requirements into system and software requirements.		
C207.2	Design the Software Configuration Management and Risk Management.		
C207.3	Measure the high-level design of the system from the software requirements.		
C207.4	Develop awareness of testing problems with testing report.		
C207.5	Demonstrate the sample project.		

Semester No:	3		
Course Title:	Operating Systems Lab	**Course Code:**	C208
Course Outcome No.	**Course Outcome Statement**		
C208.1	Examine different operating system concepts.		
C208.2	Develop C programs using Unix system call.		
C208.3	Illustrate the following IPC mechanisms		
C208.4	Simulate Page Replacement Algorithms.		
C208.5	Demonstrate Deadlock management.		

Semester No:	3		
Course Title:	NodeJS/ReactJS/Django	**Course Code:**	C209
Course Outcome No.	**Course Outcome Statement**		
C209.1	Implement website with HTML, CSS, Bootstrap and little JavaScript		
C209.2	Demonstrate Advanced features of JavaScript and learn about JDBC		
C209.3	Develop Server – side implementation using Java technologies		
C209.4	Experiment on server – side programming using Node JS		
C209.5	Design a Single Page Application using React		

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Semester No:	4		
Course Title:	Automata Theory and Compiler Design	**Course Code:**	C210
Course Outcome No.	**Course Outcome Statement**		
C210.1	Describe the fundamental concepts of abstract machines and their formal languages.		
C210.2	Design the finite state machines using regular expressions		
C210.3	Demonstrate PDA and Turing Machines.		
C210.4	Apply lexical and syntax analysis techniques.		
C210.5	Develop intermediate code and runtime environments.		

Semester No:	4		
Course Title:	Database Management Systems	**Course Code:**	C211
Course Outcome No.	**Course Outcome Statement**		
C211.1	Analyze the logical design concepts of the database.		
C211.2	Describe the physical model of a database and its operations.		
C211.3	Apply the knowledge of SQL to construct the queries for efficient data access and manipulation		
C211.4	Implement transaction processing and concurrency control.		
C211.5	Examine different indexing mechanisms and database storage access.		

Semester No:	4		
Course Title:	Mathematical and Statistical Foundations	**Course Code:**	C212
Course Outcome No.	**Course Outcome Statement**		
C212.1	Apply the concepts of probability and Random variables		
C212.2	Analyze the concept of Probability distributions to some case studies		
C212.3	Formulate and solve problems by apply statistical methods for analyzing experimental data.		
C212.4	Demonstrate the concept of estimation and distinguish regression analysis and to compute and interpret the coefficient of correlation.		
C212.5	Examine the given statistical hypothesis		

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Semester No:	4		
Course Title:	Introduction to Artificial Intelligence	**Course Code:**	C213
Course Outcome No.	**Course Outcome Statement**		
C213.1	Formulate an efficient problem space for a problem expressed in natural language		
C213.2	Select a search algorithm for a problem and estimate its time and space complexities.		
C213.3	Representing knowledge using the appropriate technique for a given problem.		
C213.4	Apply AI techniques to solve problems of game playing and machine learning.		
C213.5	Act on uncertain problem solving.		

Semester No:	4		
Course Title:	Object Oriented Programming through Java	**Course Code:**	C214
Course Outcome No.	**Course Outcome Statement**		
C214.1	Solve real world problems using OOP techniques		
C214.2	Apply the packages and interfaces, streams in I/O.		
C214.3	Examine development of exceptions, multithreaded applications with synchronization.		
C214.4	Analyze the usage of collection framework.		
C214.5	Design GUI based applications using applets and swings.		

Semester No:	4		
Course Title:	Database Management Systems Lab	**Course Code:**	C215
Course Outcome No.	**Course Outcome Statement**		
C215.1	Demonstrate the database design using ER Diagrams.		
C215.2	Develop SQL Queries to manipulate the data in the database.		
C215.3	Apply Procedural Language constructs to execute a block of SQL statements.		
C215.4	Design various triggers for different data using SQL.		
C215.5	Implement cursors using SQL.		

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Semester No:	4		
Course Title:	Java Programming Lab	**Course Code:**	C216
Course Outcome No.	**Course Outcome Statement**		
C216.1	Execute programs for solving real-world problems using java collection framework.		
C216.2	Develop the standalone applications for Multi-Threaded and Exception Handling.		
C216.3	Apply OOP in Java Programming in problem solving.		
C216.4	Design Java applets and applications.		
C216.5	Implement GUI programs using swing controls in Java		

Semester No:	4		
Course Title:	Prolog/ Lisp/Pyswip	**Course Code:**	C217
Course Outcome No.	**Course Outcome Statement**		
C217.1	Develop the program in Prolog/Lisp/PYSWIP		
C217.2	Demonstrate Real time application		
C217.3	Solve Real time problems		
C217.4	Experiment program using functions		
C217.5	Analyze the prolog predicate		

Semester No:	4		
Course Title:	Real-time Research Project/Field-Based Research Project	**Course Code:**	C218
Course Outcome No.	**Course Outcome Statement**		
C218.1	Identify and analyze real-world or societal problems to develop effective solutions		
C218.2	Apply suitable methods, tools, and technologies to design and implement practical solutions.		
C218.3	Evaluate project results and suggest evidence-based improvements.		
C218.4	Utilize project management principles to achieve project goals effectively		
C218.5	Demonstrate professional communication, ethical behavior, and proper project documentation.		

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III YEAR

Semester No:	5		
Course Title:	Design and Analysis of Algorithms	**Course Code:**	C301
Course Outcome No.	**Course Outcome Statement**		
C301.1	Analyzing the algorithm with space and time.		
C301.2	Design the algorithm using the divide and conquer greedy approach.		
C301.3	Implement dynamic programming strategy.		
C301.4	Apply the backtracking technique and branch and bound.		
C301.5	Construct the algorithm using the non-deterministic algorithm		

Semester No:	5		
Course Title:	Machine Learning	**Course Code:**	C302
Course Outcome No.	**Course Outcome Statement**		
C302.1	Distinguish between supervised, unsupervised, and semi-supervised learning techniques		
C302.2	Evaluate the performance and accuracy of various machine learning algorithms.		
C302.3	Build classifiers and design ensemble methods to increase classification accuracy.		
C302.4	Implement evolutionary computing algorithms for real-world problems		
C302.5	Analyze Reinforcement Learning and Bayesian Networks.		

Semester No:	5		
Course Title:	Computer Networks	**Course Code:**	C303
Course Outcome No.	**Course Outcome Statement**		
C303.1	Enumerate the basic concepts of reference models.		
C303.2	Apply sliding window protocols and multiple access protocols		
C303.3	Design the routing algorithms, congestion control techniques		
C303.4	Analyze TCP and UDP protocols and services of the Transport Layer.		
C303.5	Implement different protocols at the application layer.		

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Semester No:	5		
Course Title:	Business Economics & Financial Analysis	**Course Code:**	C304
Course Outcome No.	**Course Outcome Statement**		
C304.1	Describe the various forms of business and Economics.		
C304.2	Examine the demand and supply analysis.		
C304.3	Explore the usage of pricing strategies in PLC.		
C304.4	Analyze the financial accounts of a firm or company.		
C304.5	Demonstrate the financial performance of a business using ratio analysis techniques.		

Professional Elective -I

Semester No:	5		
Course Title:	Graph Theory	**Course Code:**	C305
Course Outcome No.	**Course Outcome Statement**		
C305.1	Implement classes of graph theoretic problems.		
C305.2	Apply some basic algorithms for graphs to find the shortest paths.		
C305.3	Prove central theorems about trees, matching, connectivity, coloring and planar graphs.		
C305.4	Develop independent sets and matching algorithms for graphs.		
C305.5	Formulate and prove central theorems about coloring and planar graphs.		

Semester No:	5		
Course Title:	**Introduction to Data Science**	**Course Code:**	C305
Course Outcome No.	**Course Outcome Statement**		
C305.1	Discuss a flow process for data science problems.		
C305.2	Identify types of data and basic Statistical Description.		
C305.3	Create vectors, matrices and list using R		
C305.4	Develop R codes using iterative programming		
C305.5	Correlate results to the solution approach		

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Semester No:	5		
Course Title:	Web Programming	**Course Code:**	C305
Course Outcome No.	**Course Outcome Statement**		
C305.1	Design web pages using HTML & XML.		
C305.2	Apply client side scripting using javascript.		
C305.3	Design web pages using AngularJs and ReactJS.		
C305.4	Build server side applications using servlets.		
C305.5	Apply server side programming using JSP.		

Semester No:	5		
Course Title:	Image Processing	**Course Code:**	C305
Course Outcome No.	**Course Outcome Statement**		
C305.1	Explore the basic concepts of Image processing and two-dimensional signal acquisition,sampling, and quantization.		
C305.2	Design image enhancement mechanisms		
C305.3	Apply image restoration models.		
C305.4	Implement image segmentation methods.		
C305.5	Impart the image compression techniques.		

Semester No:	5		
Course Title:	Computer Graphics	**Course Code:**	C305
Course Outcome No.	**Course Outcome Statement**		
C305.1	Describe the mathematical foundations of computer graphics and its applications.		
C305.2	Design 2D geometrical transformations and 2D viewing functions		
C305.3	Construct 3D object representations using polygonal surfaces, curves, and shading models.		
C305.4	Apply geometric projections for 3D objects and 3D viewing functions.		
C305.5	Analyze animation sequence and visible surface detection methods.		

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Semester No:	5		
Course Title:	Machine Learning Lab	**Course Code:**	C306
Course Outcome No.	**Course Outcome Statement**		
C306.1	Experiments on Machine Learning algorithms using real-world data		
C306.2	Apply the modern notions in data analysis-oriented computing.		
C306.3	Implement standard machine learning algorithms .		
C306.4	Use Python programming for AI Environment.		
C306.5	Analyze the performance of predictive models .		

Semester No:	5		
Course Title:	Computer Networks Lab	**Course Code:**	C307
Course Outcome No.	**Course Outcome Statement**		
C307.1	Implement data link layer farming methods.		
C307.2	Analyze error detection and error correction using CRC codes.		
C307.3	Design and implement routing algorithms and congestion control techniques used in networks		
C307.4	Develop Encoding and Decoding techniques used in presentation layer		
C307.5	Apply network tools for network scanning and security auditing .		

Semester No:	5		
Course Title:	UI design-Flutter	**Course Code:**	C308
Course Outcome No.	**Course Outcome Statement**		
C308.1	Install and configure Flutter and Dart environment.		
C308.2	Design responsive user interfaces using Flutter widgets.		
C308.3	Implement navigation and state management in Flutter apps.		
C308.4	Develop forms, validations, and animated UI components.		
C308.5	Integrate REST APIs and perform testing and debugging		

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Semester No:	6		
Course Title:	Knowledge Representation and Reasoning	**Course Code:**	C309
Course Outcome No.	**Course Outcome Statement**		
C309.1	Enumerate the key concepts of knowledge, Representation and Reasoning.		
C309.2	Interpret different ontological categories.		
C309.3	Apply the principles of knowledge representations.		
C309.4	Classify different types of processes and contexts.		
C309.5	Interpret vagueness, uncertainity, randomness and ignorance.		

Semester No:	6		
Course Title:	Data Analytics	**Course Code:**	C310
Course Outcome No.	**Course Outcome Statement**		
C310.1	Explore various Data Sources and Pre-processing mechanisms.		
C310.2	Experiment on data and statistical analysis.		
C310.3	Demonstrate on Regression models		
C310.4	Analyze the impact of data analytics for business decisions and strategy.		
C310.5	Implement standard data visualization and formal inference procedure		

Semester No:	6		
Course Title:	Natural Language Processing	**Course Code:**	C311
Course Outcome No.	**Course Outcome Statement**		
C311.1	Summarize the NLP structure documents		
C311.2	Use of proper experimental methodology for evaluating NLP systems		
C311.3	Construct statistical models over strings, trees and estimate parameters using supervised and unsupervised training methods		
C311.4	Implement the NLP algorithms.		
C311.5	Design different language modelling Techniques		

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. Professional Elective–II

Semester No:	6		
Course Title:	**Software Testing Methodologies**	**Course Code:**	C312
Course Outcome No.	**Course Outcome Statement**		
C312.1	Compare and contrast the various testing strategies.		
C312.2	Experiment on dataflow and domain testing strategies.		
C312.3	Build decision tables and KV charts.		
C312.4	Apply the graph-based testing metrics to its application.		
C312.5	Implement test cases using any automated testing tools (Jmeter or WinRunner).		

Semester No:	6		
Course Title:	Information Retrieval Systems	**Course Code:**	C312
Course Outcome No.	**Course Outcome Statement**		
C312.1	Apply IR principles to locate relevant information large collections of data.		
C312.2	Develop data models using statistical approaches		
C312.3	Implement different automatic document clustering algorithms.		
C312.4	Design the Information Retrieval System for web search tasks.		
C312.5	Apply visualization tools for multimedia information retrieval		

Semester No:	6		
Course Title:	Pattern Recognition	**Course Code:**	C312
Course Outcome No.	**Course Outcome Statement**		
C312.1	Interpret the importance of pattern recognition and its representation.		
C312.2	Analyze the variants of Nearest Neighbour algorithm.		
C312.3	Identify the necessity of Hidden Markov models.		
C312.4	Examine the support vector machine classifier and ensembles of classifiers.		
C312.5	Design the different types of clustering algorithms		

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Semester No:	6		
Course Title:	Computer Vision and Robotics	**Course Code:**	C312
Course Outcome No.	**Course Outcome Statement**		
C312.1	Apply fundamental image processing techniques required for computer vision.		
C312.2	Examine Linear Filters, Edge Detection and Texture Analysis.		
C312.3	Apply segmentation by clustering.		
C312.4	Develop segmentation and Fitting using Probabilistic methods.		
C312.5	Enumerate common sensing techniques for reactive robots.		

Semester No:	6		
Course Title:	Data Warehousing and Business Intelligence	**Course Code:**	C312
Course Outcome No.	**Course Outcome Statement**		
C312.1	Design a data warehouse and perform OLAP operations.		
C312.2	Enumerate the fundamental concepts of Business Intelligence.		
C312.3	Compare Business Intelligence Key Performance indicators.		
C312.4	Make use of Advanced Business Intelligence Tools.		
C312.5	Develop Integrated Business Intelligence systems.		

Open Elective-I

Semester No:	6		
Course Title:	Fundamentals of Internet of Things	**Course Code:**	C313
Course Outcome No.	**Course Outcome Statement**		
C313.1	Understand the basic protocols in sensor networks		
C313.2	Analyze Program and configure Arduino boards for various designs.		
C313.3	Apply Python programming and interfacing for Raspberry Pi.		
C313.4	Design IoT applications in different domains.		
C313.5	Discuss Cloud Computing with case study		

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Semester No:	6		
Course Title:	Data Analytics Lab	**Course Code:**	C314
Course Outcome No.	**Course Outcome Statement**		
C314.1	Apply data preprocessing methods		
C314.2	Develop linear regression and logistic regression models.		
C314.3	Design different classification models.		
C314.4	Apply data visualization techniques using different graphs.		
C314.5	Design predictive models for different types of data.		

Semester No:	6		
Course Title:	Advanced English Communication Skill lab	**Course Code:**	C315
Course Outcome No.	**Course Outcome Statement**		
C315.1	Interpret the vocabulary to improve the fluency in English.		
C315.2	Comprehend effectively in different contexts.		
C315.3	Develop proficiency in academic reading and writing.		
C315.4	Identify possibilities of job prospects.		
C315.5	Communicate effectively in formal and informal contexts.		

Semester No:	6		
Course Title:	Natural Language Processing Lab	**Course Code:**	C316
Course Outcome No.	**Course Outcome Statement**		
C316.1	Apply Tokenization and Stop word Removal techniques.		
C316.2	Develop Porter stemmer algorithm for stemming.		
C316.3	Design NLP model for POS tagging.		
C316.4	Develop Morphological Analysis using NLTK library.		
C316.5	Build a model that converts audio into text using NLTK.		

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Semester No:	6		
Course Title:	Industrial Oriented Mini Project/Internship/ Skill Development Course(DevOps)	**Course Code:**	C317
Course Outcome No.	**Course Outcome Statement**		
C317.1	Identify and explain the problem clearly, generate creative ideas to solve it, and analyze the problem critically to develop effective solutions.		
C317.2	Apply appropriate methods, tools, and technologies to design and implement practical and functional solutions		
C317.3	Analyze project results, interpret findings, and evaluate outcomes to suggest evidence-based improvements		
C317.4	Evaluate contributions to achieve project goals through project management principles		
C317.5	Demonstrate professional communication and ethical behavior through proper project documentation and presentation		

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IV YEAR

Semester No:	7		
Course Title:	Professional Practice, Law & Ethics	**Course Code:**	C401
Course Outcome No.	**Course Outcome Statement**		
C401.1	Practice ethics and rule of the land in their profession		
C401.2	Follow the principles and elements of legal contracts		
C401.3	Able to resolve disputes pertaining to arbitration, reconciliation		
C401.4	Aware of intellectual property loss.		
C401.5	Discuss the Law relating to Intellectual property		

Semester No:	7		
Course Title:	Deep Learning	**Course Code:**	C402
Course Outcome No.	**Course Outcome Statement**		
C402.1	Implement deep Learning algorithms and their applications in real-world data.		
C402.2	Create optimal usage of data for training deep models.		
C402.3	Apply CNN models for real-world data.		
C402.4	Create and Evaluate RNN models for real-world data		
C402.5	Develop deep models for real-world problems.		

Professional Elective-III

Semester No:	7		
Course Title:	Internet of Things	**Course Code:**	C403
Course Outcome No.	**Course Outcome Statement**		
C403.1	Interpret the impact and challenges posed by IoT in different domains leading to new architectural models.		
C403.2	Compare and Contrast the deployment of smart objects and the technologies to connect them in M2M network with necessary protocols.		
C403.3	Implement Python Programs to operate different IoT Devices.		
C403.4	Expertise Raspberry PI platform and different APIs used in various IoT applications.		
C403.5	Solve different real-time case studies and identify the IoT applications in Industry.		

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Semester No:	7		
Course Title:	Data Mining	**Course Code:**	C403
Course Outcome No.	**Course Outcome Statement**		
C403.1	Explore the types of data to be mined and primitives of the data mining system.		
C403.2	Extract interesting patterns from large amounts of data.		
C403.3	Discover the classification of data mining in various fields.		
C403.4	Employ suitable data mining algorithms to clustering applications.		
C403.5	Evaluate the accuracy of supervised and unsupervised models and algorithms.		

Semester No:	7		
Course Title:	Go Programming	**Course Code:**	C403
Course Outcome No.	**Course Outcome Statement**		
C403.1	Illustrate the basic concepts of Go programming		
C403.2	Demonstrate functions and methods in Go programming		
C403.3	Outline interfaces, Goroutines and channels in Go programming		
C403.4	Make use of concurrency with shared variables		
C403.5	Demonstrate the use of packages and the Go Tool.		

Semester No:	7		
Course Title:	Mobile Application Development	**Course Code:**	C403
Course Outcome No.	**Course Outcome Statement**		
C403.1	Work on Android OS Practically.		
C403.2	Apply the concepts of mobile applications and user interfaces on Android.		
C403.3	Develop the broadcast and notifications on mobile applications.		
C403.4	Create persistent storage for Android Applications.		
C403.5	Design database for mobile Android Applications.		

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Semester No:	7		
Course Title:	Cloud Computing	**Course Code:**	C403
Course Outcome No.	**Course Outcome Statement**		
C403.1	Practice on different computing paradigms and potential of the paradigms and specifically cloud computing.		
C403.2	Identify cloud service types, and practice on cloud deployment models and technologies supporting and driving the cloud.		
C403.3	Acquire the knowledge of programming models for cloud and development of software application that runs the cloud and various services available from major cloud providers.		
C403.4	Design networking for cloud computing.		
C403.5	Analyze security concerns and issues in cloud computing.		

Professional Elective-IV

Semester No:	7		
Course Title:	Quantum Computing	**Course Code:**	C404
Course Outcome No.	**Course Outcome Statement**		
C404.1	Discuss Basics of Quantum Computing.		
C404.2	Disseminate physical implementation of Qubit.		
C404.3	Apply Quantum Algorithms and Their Implementation		
C404.4	Develop the Impact of Quantum Computing Cryptography.		
C404.5	Compare Between Classical and Quantum Information Theory.		

Semester No:	7		
Course Title:	Generative AI	**Course Code:**	C404
Course Outcome No.	**Course Outcome Statement**		
C404.1	List the challenges of Generative modeling		
C404.2	Illustrate the Generative models for Text		
C404.3	Describe the different image Generative models		
C404.4	Outline the different models for generating painting and music		
C404.5	Summarize open source models for generating text, image, music		

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Semester No:	7		
Course Title:	Semantic Web	**Course Code:**	C404
Course Outcome No.	**Course Outcome Statement**		
C404.1	Discuss the characteristics of the semantic web technology		
C404.2	Disseminate the concepts Web Science, semantics of knowledge resource and ontology		
C404.3	Identify the logic semantics and inference with OWL.		
C404.4	Use ontology engineering approaches in semantic applications.		
C404.5	Explain about Semantic web applications.		

Semester No:	7		
Course Title:	Nature Inspired Computing	**Course Code:**	C404
Course Outcome No.	**Course Outcome Statement**		
C404.1	Familiar with Evolutionary Computing algorithms		
C404.2	Discuss Scope of Neuro computing.		
C404.3	Compare different Ant Colony Optimization algorithmic models.		
C404.4	Analyze the scope of artificial immune systems.		
C404.5	Tackle Different Real-world problems		

Semester No:	7		
Course Title:	Mobile Computing	**Course Code:**	C404
Course Outcome No.	**Course Outcome Statement**		
C404.1	Discuss the Concept of Mobile Computing Paradigm.		
C404.2	Analyze MAC and Mobile Network Layer.		
C404.3	Disseminate the issues of Mobile Network Layer.		
C404.4	Classification of Data Delivery Mechanisms.		
C404.5	Explain Classification of Routing Algorithms.		

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OPEN ELECTIVE-II

Semester No:	7		
Course Title:	Electronic sensors	**Course Code:**	C405
Course Outcome No.	**Course Outcome Statement**		
C405.1	Describe sensor Principle, Classification and Characterization.		
C405.2	Explore the working of Electromechanical, Thermal Sensors		
C405.3	Design a Magnetic sensors		
C405.4	Use a system with sensors.		
C405.5	Analyze the basic concepts of Smart Sensors.		

Semester No:	7		
Course Title:	Deep Learning lab	**Course Code:**	C406
Course Outcome No.	**Course Outcome Statement**		
C406.1	Choose the Spyder IDE Environment.		
C406.2	Interpret Keras, Tensorflow and Pytorch libraries.		
C406.3	Apply the Convolution Neural Network on computer vision problems.		
C406.4	Build a sentiment analysis model on IMDB dataset and use RNN layers		
C406.5	Evaluate Deep Learning Algorithms and Solve Real-world problems.		

Professional Elective-III Lab

Semester No:	7		
Course Title:	Internet of Things Lab	**Course Code:**	C407
Course Outcome No.	**Course Outcome Statement**		
C407.1	Perform the concept of M2M with necessary protocols.		
C407.2	Implement distance sensor applications.		
C407.3	Write python programming for IoT Devices.		
C407.4	Develop models with connecting distance sensors, LED's, Temperature sensors and other sensors with Arduino Board and Node MCU.		
C407.5	Configure MySQL with DJANGO framework to create DJANGO project.		

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Semester No:	7		
Course Title:	Data Mining Lab	**Course Code:**	C407
Course Outcome No.	**Course Outcome Statement**		
C407.1	Apply preprocessing statistical methods for any given raw data.		
C407.2	Gain practical experience of constructing a data warehouse.		
C407.3	Implement various algorithms for data mining in order to discover interesting patterns from large amounts of data.		
C407.4	Apply OLAP operations on data cube construction		
C407.5	Compute information gain measure		

Semester No:	7		
Course Title:	Go Programming Lab	**Course Code:**	C407
Course Outcome No.	**Course Outcome Statement**		
C407.1	Write basic programs using Go language		
C407.2	Demonstrate the use of packages in Go programming		
C407.3	Write Go programs using strings and arrays		
C407.4	Implement CRUD operations using mysql and Go language		
C407.5	Build real-time applications using Go language.		

Semester No:	7		
Course Title:	Mobile Application Development Lab	**Course Code:**	C407
Course Outcome No.	**Course Outcome Statement**		
C407.1	Work with Android operating system practically.		
C407.2	Configure Android environment and use development tools.		
C407.3	Develop rich user Interfaces by using layouts and controls.		
C407.4	Implement User Interface components for android application development.		
C407.5	Create Android applications using a database and publish it.		

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Semester No:	7		
Course Title:	Cloud computing lab	**Course Code:**	C407
Course Outcome No.	**Course Outcome Statement**		
C407.1	Install virtualbox/vmware workstation with different flavors using different OS.		
C407.2	Install Google app engine.		
C407.3	Simulate cloud scenarios using Cloudsim.		
C407.4	Find procedures for cloud service providers like cloudsim, Globus Toolkit		
C407.5	Examine various programming paradigm suitable to solve real world and scientific problems using cloud services.		

Semester No:	7		
Course Title:	Project Stage-I	**Course Code:**	C408
Course Outcome No.	**Course Outcome Statement**		
C408.1	Identify a real-time problem and its objectives.		
C408.2	Analyze relevant literature for identify research gaps		
C408.3	Apply appropriate design and modeling techniques for problem-solving.		
C408.4	Demonstrate effective presentation skills and meaningful contribution to the project work.		
C408.5	Justify and defend the project effectively in viva.		

Professional Elective-V

Semester No:	8		
Course Title:	Social Network Analysis	**Course Code:**	C409
Course Outcome No.	**Course Outcome Statement**		
C409.1	Describe the basic concepts of Social Network Analysis		
C409.2	Demonstrate social network analysis using NodeXL		
C409.3	Analyze email networks, thread networks and twitter networks		
C409.4	Infer facebook networks and www hyperlink networks		
C409.5	Outline youtube networks and wiki networks		

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Semester No:	8		
Course Title:	Federated Machine Learning	**Course Code:**	C409
Course Outcome No.	**Course Outcome Statement**		
C409.1	Understand the basics on privacy-preserving ML		
C409.2	Analyze the key concepts of Distributed ML and FL		
C409.3	Design key concepts and applications of Horizontal FL and Vertical FL		
C409.4	Motivates the intensive mechanism design for FL		
C409.5	Analyze the concepts of federated reinforcement learning		

Semester No:	8		
Course Title:	Augmented Reality & Virtual Reality	**Course Code:**	C409
Course Outcome No.	**Course Outcome Statement**		
C409.1	Describe how AR systems work and list the applications of AR.		
C409.2	Design the software architectures of AR.		
C409.3	Understand the Visual perception and rendering in VR		
C409.4	Find the interaction, auditory perception and rendering in VR		
C409.5	Describe the motion in real and virtual worlds.		

Semester No:	8		
Course Title:	Web Security	**Course Code:**	C409
Course Outcome No.	**Course Outcome Statement**		
C409.1	Gain knowledge of Ad Hoc and Wireless Sensor Networks.		
C409.2	Compare the MAC and routing protocols for ad hoc networks.		
C409.3	Design the solutions for TCP over Ad-hoc sensor networks.		
C409.4	Solve the issues in real-time application development based on ASN.		
C409.5	Develop the applications in the domain of ASN.		

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Semester No:	8		
Course Title:	Ad-hoc & Sensor Networks	**Course Code:**	C409
Course Outcome No.	**Course Outcome Statement**		
C409.1	Gain knowledge of Ad Hoc and Wireless Sensor Networks.		
C409.2	Compare the MAC and routing protocols for ad hoc networks.		
C409.3	Design the solutions for TCP over Ad-hoc sensor networks.		
C409.4	Solve the issues in real-time application development based on ASN.		
C409.5	Develop the applications in the domain of ASN.		

Professional Elective–VI

Semester No:	8		
Course Title:	Speech and Video Processing	**Course Code:**	C410
Course Outcome No.	**Course Outcome Statement**		
C410.1	Describe the mechanisms of human speech production systems and methods for speech feature extraction.		
C410.2	Understand basic algorithms of speech analysis and speech recognition.		
C410.3	Explain basic techniques in digital video processing, including imaging characteristics and sensors.		
C410.4	Apply motion estimation and object tracking algorithms on video.		
C410.5	Employ diverse techniques in object tracking and segmentation to contribute to real-world video analysis and applications		

Semester No:	8		
Course Title:	Robotic Process Automation	**Course Code:**	C410
Course Outcome No.	**Course Outcome Statement**		
C410.1	Implement the concepts of Robotic Process Automation and UI Path tool.		
C410.2	Apply the flow chart mechanism in various calculations.		
C410.3	Design controls, OCR, Plugins, and extensions.		
C410.4	Create user events, exception handling and debugging techniques.		
C410.5	Prepare system management techniques.		

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Semester No:	8		
Course Title:	Randomized Algorithms	**Course Code:**	C410
Course Outcome No.	**Course Outcome Statement**		
C410.1	Appreciate the fundamentals of randomized algorithm design.		
C410.2	Understand the fundamentals of Markov chains and the Monte Carlo method.		
C410.3	Apply high probability analysis to selected randomized algorithms.		
C410.4	Understand the Fingerprint and Pattern Matching techniques		
C410.5	Apply geometrics and parallel algorithms.		

Semester No:	8		
Course Title:	Cognitive Computing	**Course Code:**	C410
Course Outcome No.	**Course Outcome Statement**		
C410.1	Understand cognitive computing		
C410.2	Plan and use the primary tools associated with cognitive computing.		
C410.3	Plan and execute a project that leverages cognitive computing		
C410.4	Understand and develop the business implications of cognitive computing.		
C410.5	Develop the business implications of cognitive computing.		

Semester No:	8		
Course Title:	Conversational AI	**Course Code:**	C410
Course Outcome No.	**Course Outcome Statement**		
C410.1	Understand the basic technologies required for building a conversational system.		
C410.2	Learn the rule-based dialogue system		
C410.3	Involve AI in building conversational system and build advanced systems that are cognitively inclined towards human behavior.		
C410.4	Develop a real time working conversational system for social domain that can intelligently process inputs and generate relevant replies.		
C410.5	Design and implement neural dialogue systems for conversational AI.		

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OPEN ELECTIVE- III

Semester No:	8		
Course Title:	Data Visualization using Python	**Course Code:**	C411
Course Outcome No.	**Course Outcome Statement**		
C411.1	Apply visualization principles using Python libraries.		
C411.2	Analyze datasets using Pandas and Matplotlib.		
C411.3	Evaluate data patterns using Seaborn and Altair.		
C411.4	Implement interactive visualization techniques using Plotly.		
C411.5	Examine advanced visualizations using Plotnine.		

Semester No:	8		
Course Title:	Project Stage–II including Seminar	**Course Code:**	C412
Course Outcome No.	**Course Outcome Statement**		
C412.1	Apply analytical and numerical techniques to model and solve engineering problems.		
C412.2	Design experimental setups and execute the project using tools and methods.		
C412.3	Interpret results, extract key findings, and demonstrate technical depth and contribution.		
C412.4	Compile and structure a comprehensive project report		
C412.5	Demonstrate and defend the project effectively.		