

**Department of CSE [Artificial Intelligence & Machine Learning]**

**R22 COURSE OUTCOMES**

**I YEAR**

|                           |                                                                                                                         |                     |      |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------|---------------------|------|
| <b>Semester No:</b>       | 1                                                                                                                       |                     |      |
| <b>Course Title:</b>      | Matrices and Calculus                                                                                                   | <b>Course Code:</b> | C101 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                                                         |                     |      |
| 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.                                                |                     |      |

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| <b>Semester No:</b>       | 1                                                                                                                                                                                                          |                     |      |
| <b>Course Title:</b>      | Applied Physics                                                                                                                                                                                            | <b>Course Code:</b> | C102 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                                                                                                                                            |                     |      |
| 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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| <b>Semester No:</b>       | 1                                                          |                     |      |
| <b>Course Title:</b>      | Programming for Problem Solving                            | <b>Course Code:</b> | C103 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                            |                     |      |
| C103.1                    | Illustrate algorithms and flowcharts for solving problems. |                     |      |
| C103.2                    | Demonstrate arrays, strings and structures.                |                     |      |
| C103.3                    | Explore pointers, file handling techniques.                |                     |      |
| C103.4                    | Analyze various functions and dynamic memory allocation.   |                     |      |
| C103.5                    | Summarize various sorting and searching algorithms.        |                     |      |

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

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| <b>Semester No:</b>       | 1                                                                                   |                     |      |
| <b>Course Title:</b>      | IT Workshop                                                                         | <b>Course Code:</b> | C105 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                     |                     |      |
| C105.1                    | Apply knowledge for PC hardware and computer parts                                  |                     |      |
| C105.2                    | Explore knowledge for computer assembling                                           |                     |      |
| C105.3                    | Analyze how to solve the trouble shooting problems.                                 |                     |      |
| C105.4                    | Demonstrate the tools for preparation of project certificate, Creating a Newsletter |                     |      |
| C105.5                    | Use the tools for preparation of PPT, Documentation and budget sheet etc            |                     |      |

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| <b>Semester No:</b>       | 1                                                                                                                                            |                     |      |
| <b>Course Title:</b>      | Applied Physics Laboratory                                                                                                                   | <b>Course Code:</b> | C106 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                                                                              |                     |      |
| C106.1                    | Determine Planck's constant using the photoelectric effect.                                                                                  |                     |      |
| C106.2                    | Apply quantum physics concepts to semiconductor and optoelectronic devices and identify n-type or p-type material using the Hall experiment. |                     |      |
| C106.3                    | Explain applications of dielectric constant and analyze the magnetic behavior using hysteresis curves.                                       |                     |      |
| C106.4                    | Examine the characteristics of LASER and perform optical fiber measurements.                                                                 |                     |      |
| C106.5                    | Perform data analysis using experimental results.                                                                                            |                     |      |

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| <b>Semester No:</b>       | 1                                                                           |                     |      |
| <b>Course Title:</b>      | Programming for Problem Solving Laboratory                                  | <b>Course Code:</b> | C107 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                             |                     |      |
| C107.1                    | Solve the problems through programming.                                     |                     |      |
| C107.2                    | Demonstrate arrays, pointers and functions for different types of problems. |                     |      |
| C107.3                    | Illustrate the file operations.                                             |                     |      |
| C107.4                    | Explore various String manipulation techniques.                             |                     |      |
| C107.5                    | Implement various sorting and searching techniques.                         |                     |      |

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| <b>Semester No:</b>       | 1                                                                                   |                     |      |
| <b>Course Title:</b>      | English Language and Communication Skills Laboratory                                | <b>Course Code:</b> | C108 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                     |                     |      |
| C108.1                    | Demonstrate accents through audio- visual experience and practice.                  |                     |      |
| C108.2                    | Apply Pronounce English sounds according to standard pronunciation (RP of England). |                     |      |
| C108.3                    | Express fluently and clearly in English.                                            |                     |      |
| C108.4                    | Revise their speech by Neutralizing the accent.                                     |                     |      |
| C108.5                    | Practice presentations and discussions effectively and confidently.                 |                     |      |

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| <b>Semester No:</b>       | 1                                                          |                     |      |
| <b>Course Title:</b>      | <b>Basic Elements of Engineering Technology</b>            | <b>Course Code:</b> | C109 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                            |                     |      |
| C109.1                    | Explore the principles of IOT and its architecture.        |                     |      |
| C109.2                    | Outline the components and working principles of robot.    |                     |      |
| C109.3                    | Illustrate 3D printing and its applications.               |                     |      |
| C109.4                    | Analyse Software and Post Processing                       |                     |      |
| C109.5                    | Develop the solution for various Engineering applications. |                     |      |

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| <b>Semester No:</b>       | 2                                                                                                                                                  |                     |      |
| <b>Course Title:</b>      | <b>Ordinary Differential Equations and Vector Calculus</b>                                                                                         | <b>Course Code:</b> | C110 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                                                                                    |                     |      |
| C110.1                    | Demonstrate First Order Differential Equations and its applications.                                                                               |                     |      |
| C110.2                    | Solve higher order differential equations for real world problems.                                                                                 |                     |      |
| 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                    | Illustrate vector differentiation.                                                                                                                 |                     |      |
| C110.5                    | Apply Vector Integration and their conversion.                                                                                                     |                     |      |

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| <b>Semester No:</b>       | 2                                                                           |                     |      |
| <b>Course Title:</b>      | <b>Engineering Chemistry</b>                                                | <b>Course Code:</b> | C111 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                             |                     |      |
| C111.1                    | Describe the atomic, molecular and complex compound structures.             |                     |      |
| C111.2                    | Analyze general properties of polymers and other engineering materials.     |                     |      |
| C111.3                    | Demonstrate the principles and concepts of electro chemistry and corrosion  |                     |      |
| C111.4                    | Interpret the concepts of petroleum products                                |                     |      |
| C111.5                    | Summarize engineering materials like cement, smart materials andLubricants. |                     |      |

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| <b>Semester No:</b>       | 2                                                                                                            |                     |      |
| <b>Course Title:</b>      | Data Structures                                                                                              | <b>Course Code:</b> | C112 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                                              |                     |      |
| 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                                            |                     |      |

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| <b>Semester No:</b>       | 2                                                                                   |                     |      |
| <b>Course Title:</b>      | Basic Electrical and Electronics Engineering                                        | <b>Course Code:</b> | C113 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                     |                     |      |
| C113.1                    | Analyze the basic Electrical circuits using different network reduction techniques. |                     |      |
| C113.2                    | Describe the components of low Voltage Electrical Installations                     |                     |      |
| C113.3                    | Explore working principles of Electrical Machines.                                  |                     |      |
| C113.4                    | Illustrate characteristics of diodes and its applications                           |                     |      |
| C113.5                    | Summarize characteristics of transistors and their applications.                    |                     |      |

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| <b>Semester No:</b>       | 2                                                                                                                                    |                     |      |
| <b>Course Title:</b>      | Computer Aided Engineering Graphics                                                                                                  | <b>Course Code:</b> | C114 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                                                                      |                     |      |
| C114.1                    | Describe basics of engineering drawing.                                                                                              |                     |      |
| C114.2                    | Implement different types of projections.                                                                                            |                     |      |
| C114.3                    | Analyze the need of projections of solids (prisms, pyramids, cone and cylinder) manually and by using computer aided drafting tools. |                     |      |
| C114.4                    | Develop section views and true shape section of various types of solids                                                              |                     |      |
| C114.5                    | Explore the different Isometric Projections.                                                                                         |                     |      |

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| <b>Semester No:</b>       | 2                                                                                                               |                     |      |
| <b>Course Title:</b>      | Engineering Chemistry Laboratory                                                                                | <b>Course Code:</b> | C115 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                                                 |                     |      |
| C115.1                    | Analyze water hardness and evaluate corrosion rate of mild steel under different conditions.                    |                     |      |
| C115.2                    | Apply conductometric and potentiometric methods to determine concentrations and equivalence points.             |                     |      |
| C115.3                    | Explore Synthesize polymers such as Bakelite and Nylon-6,6.                                                     |                     |      |
| C115.4                    | Evaluate physicochemical properties of lubricants such as viscosity, surface tension, and saponification value. |                     |      |
| C115.5                    | Demonstrate the working principles of modern chemical systems through virtual lab experiments.                  |                     |      |

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| <b>Semester No:</b>       | 2                                                                  |                     |      |
| <b>Course Title:</b>      | Data Structures Laboratory                                         | <b>Course Code:</b> | C116 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                    |                     |      |
| C116.1                    | Explore the linear data structures                                 |                     |      |
| C116.2                    | Understanding of linear data structures such as stacks and queues. |                     |      |
| C116.3                    | Construct various non linear data structures.                      |                     |      |
| C116.4                    | Compare various searching and sorting algorithms.                  |                     |      |
| C116.5                    | Implement trees and graphs traversals                              |                     |      |

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| <b>Semester No:</b>       | 2                                                                        |                     |      |
| <b>Course Title:</b>      | Basic Electrical and Electronics Engineering Laboratory                  | <b>Course Code:</b> | C117 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                          |                     |      |
| C117.1                    | Analyze various electrical networks using circuit laws.                  |                     |      |
| C117.2                    | Demonstrate the performance of DC Motors and single-phase transformer.   |                     |      |
| C117.3                    | Explore the performance of three phase induction motors and alternators. |                     |      |
| C117.4                    | Illustrate the characteristics of semi-conductor devices.                |                     |      |
| C117.5                    | Describe the half wave and full wave rectifiers.                         |                     |      |

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| <b>Semester No:</b>       | 2                                                                                                                                                                                                                                                |                     |      |
| <b>Course Title:</b>      | Environmental Science                                                                                                                                                                                                                            | <b>Course Code:</b> | C118 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                                                                                                                                                                                  |                     |      |
| C118.1                    | Apply concepts and methods from ecological and physical sciences and their application in environmental problem solving.                                                                                                                         |                     |      |
| C118.2                    | Analyze synthesize scientific data to characterize and evaluate the status of atleast 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

|                           |                                                              |                     |      |
|---------------------------|--------------------------------------------------------------|---------------------|------|
| <b>Semester No:</b>       | 3                                                            |                     |      |
| <b>Course Title:</b>      | Discrete Mathematics                                         | <b>Course Code:</b> | C201 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                              |                     |      |
| C201.1                    | Construct precise mathematical proofs                        |                     |      |
| C201.2                    | Use logic and set theory to formulate precise statements.    |                     |      |
| C201.3                    | Analyze counting problems on finite and discrete structures. |                     |      |
| C201.4                    | Solve counting problems and recurrence relation              |                     |      |
| C201.5                    | Apply graph theory in solving computing problems.            |                     |      |

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| <b>Semester No:</b>       | 3                                                                                                                            |                     |      |
| <b>Course Title:</b>      | Software Engineering                                                                                                         | <b>Course Code:</b> | C202 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                                                              |                     |      |
| 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                                         |                     |      |

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| <b>Semester No:</b>       | 3                                                                          |                     |      |
| <b>Course Title:</b>      | Programming with Python                                                    | <b>Course Code:</b> | C203 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                            |                     |      |
| C203.1                    | Apply the concepts of probability and Random variables                     |                     |      |
| C203.2                    | Analyze the concept of Probability distributions to some case studies      |                     |      |
| 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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| <b>Semester No:</b>       | 3                                                               |                     |      |
| <b>Course Title:</b>      | Computer Organization and Architecture                          | <b>Course Code:</b> | C204 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                 |                     |      |
| 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.     |                     |      |

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| <b>Semester No:</b>       | 3                                                                        |                     |      |
| <b>Course Title:</b>      | Operating Systems                                                        | <b>Course Code:</b> | C205 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                          |                     |      |
| 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 |                     |      |

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| <b>Semester No:</b>       | 3                                                                                   |                     |      |
| <b>Course Title:</b>      | Python Lab                                                                          | <b>Course Code:</b> | C206 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                     |                     |      |
| C206.1                    | Practice the basic concepts of python programming.                                  |                     |      |
| C206.2                    | Apply functions to design modular programming and perform string operations         |                     |      |
| C206.3                    | Analyze various data structures like lists, set, dictionaries and tuples in python. |                     |      |
| C206.4                    | Apply object-oriented programming concepts                                          |                     |      |
| C206.5                    | Develop applications using modules, GUI, and scientific libraries.                  |                     |      |

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| <b>Semester No:</b>       | 3                                                                          |                     |      |
| <b>Course Title:</b>      | Software Engineering Lab                                                   | <b>Course Code:</b> | C207 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                            |                     |      |
| 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.                                            |                     |      |

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| <b>Semester No:</b>       | 3                                            |                     |      |
| <b>Course Title:</b>      | Operating Systems Lab                        | <b>Course Code:</b> | C208 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>              |                     |      |
| 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.             |                     |      |

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| <b>Semester No:</b>       | 3                                                                 |                     |      |
| <b>Course Title:</b>      | NodeJS/ReactJS/Django                                             | <b>Course Code:</b> | C209 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                   |                     |      |
| 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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| <b>Semester No:</b>       | 4                                                                                  |                     |      |
| <b>Course Title:</b>      | Automata Theory and Compiler Design                                                | <b>Course Code:</b> | C210 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                    |                     |      |
| 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                    | Apply lexical and syntax analysis techniques.                                      |                     |      |

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| <b>Semester No:</b>       | 4                                                                                              |                     |      |
| <b>Course Title:</b>      | Database Management Systems                                                                    | <b>Course Code:</b> | C211 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                                |                     |      |
| 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.                             |                     |      |

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| <b>Semester No:</b>       | 4                                                                                                                                      |                     |      |
| <b>Course Title:</b>      | Mathematical and Statistical Foundations                                                                                               | <b>Course Code:</b> | C212 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                                                                        |                     |      |
| 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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| <b>Semester No:</b>       | 4                                                                                     |                     |      |
| <b>Course Title:</b>      | Introduction to Artificial Intelligence                                               | <b>Course Code:</b> | C213 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                       |                     |      |
| 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.                                                     |                     |      |

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| <b>Semester No:</b>       | 4                                                                                   |                     |      |
| <b>Course Title:</b>      | Object Oriented Programming through Java                                            | <b>Course Code:</b> | C214 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                     |                     |      |
| 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.                             |                     |      |

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|---------------------------|----------------------------------------------------------------------------|---------------------|------|
| <b>Semester No:</b>       | 4                                                                          |                     |      |
| <b>Course Title:</b>      | Database Management Systems Lab                                            | <b>Course Code:</b> | C215 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                            |                     |      |
| 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.                                               |                     |      |

**Department of CSE [Artificial Intelligence & Machine Learning]**

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|---------------------------|-----------------------------------------------------------------------------------|---------------------|------|
| <b>Semester No:</b>       | 4                                                                                 |                     |      |
| <b>Course Title:</b>      | Java Programming Lab                                                              | <b>Course Code:</b> | C216 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                   |                     |      |
| 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                               |                     |      |

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| <b>Semester No:</b>       | 4                                         |                     |      |
| <b>Course Title:</b>      | Prolog/ Lisp/Pyswip                       | <b>Course Code:</b> | C217 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>           |                     |      |
| 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              |                     |      |

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| <b>Semester No:</b>       | 4                                                                                            |                     |      |
| <b>Course Title:</b>      | Real-time Research<br>Project/Field-Based Research<br>Project                                | <b>Course Code:</b> | C218 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                              |                     |      |
| 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.  |                     |      |

**Department of CSE [Artificial Intelligence & Machine Learning]**

III YEAR

|                           |                                                                    |                     |      |
|---------------------------|--------------------------------------------------------------------|---------------------|------|
| <b>Semester No:</b>       | 5                                                                  |                     |      |
| <b>Course Title:</b>      | Design and Analysis of Algorithms                                  | <b>Course Code:</b> | C301 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                    |                     |      |
| 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      |                     |      |

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| <b>Semester No:</b>       | 5                                                                                     |                     |      |
| <b>Course Title:</b>      | Machine Learning                                                                      | <b>Course Code:</b> | C302 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                       |                     |      |
| 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.                                 |                     |      |

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| <b>Semester No:</b>       | 5                                                                  |                     |      |
| <b>Course Title:</b>      | Computer Networks                                                  | <b>Course Code:</b> | C303 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                    |                     |      |
| 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             |                     |      |

**Department of CSE [Artificial Intelligence & Machine Learning]**

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| <b>Semester No:</b>       | 5                                                                                    |                     |      |
| <b>Course Title:</b>      | Business Economics & Financial Analysis                                              | <b>Course Code:</b> | C304 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                      |                     |      |
| 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

|                           |                                                                                         |                     |      |
|---------------------------|-----------------------------------------------------------------------------------------|---------------------|------|
| <b>Semester No:</b>       | 5                                                                                       |                     |      |
| <b>Course Title:</b>      | Graph Theory(PE-1)                                                                      | <b>Course Code:</b> | C305 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                         |                     |      |
| 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.                  |                     |      |

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|---------------------------|-----------------------------------------------------------|---------------------|------|
| <b>Semester No:</b>       | 5                                                         |                     |      |
| <b>Course Title:</b>      | Introduction to Data Science(PE-1)                        | <b>Course Code:</b> | C305 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                           |                     |      |
| 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 resultsto the solution approach                 |                     |      |

**Department of CSE [Artificial Intelligence & Machine Learning]**

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|---------------------------|------------------------------------------------|---------------------|------|
| <b>Semester No:</b>       | 5                                              |                     |      |
| <b>Course Title:</b>      | Web Programming(PE-1)                          | <b>Course Code:</b> | C305 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                |                     |      |
| 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.       |                     |      |

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| <b>Semester No:</b>       | 5                                                                                                                 |                     |      |
| <b>Course Title:</b>      | Image Processing(PE-1)                                                                                            | <b>Course Code:</b> | C305 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                                                   |                     |      |
| 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.                                                                          |                     |      |

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| <b>Semester No:</b>       | 5                                                                                         |                     |      |
| <b>Course Title:</b>      | Computer Graphics(PE-1)                                                                   | <b>Course Code:</b> | C305 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                           |                     |      |
| 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.                         |                     |      |

**Department of CSE [Artificial Intelligence & Machine Learning]**

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|---------------------------|------------------------------------------------------------------|---------------------|------|
| <b>Semester No:</b>       | 5                                                                |                     |      |
| <b>Course Title:</b>      | Machine Learning Lab                                             | <b>Course Code:</b> | C306 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                  |                     |      |
| 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                    | UsePython programming for AI Environment.                        |                     |      |
| C306.5                    | Analyze the performance of predictive models .                   |                     |      |

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| <b>Semester No:</b>       | 5                                                                                          |                     |      |
| <b>Course Title:</b>      | Computer Networks Lab                                                                      | <b>Course Code:</b> | C307 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                            |                     |      |
| 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 .                           |                     |      |

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| <b>Semester No:</b>       | 5                                                          |                     |      |
| <b>Course Title:</b>      | UI design-Flutter                                          | <b>Course Code:</b> | C308 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                            |                     |      |
| 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      |                     |      |

**Department of CSE [Artificial Intelligence & Machine Learning]**

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|---------------------------|----------------------------------------------------------------|---------------------|------|
| <b>Semester No:</b>       | 6                                                              |                     |      |
| <b>Course Title:</b>      | Knowledge Representation and Reasoning                         | <b>Course Code:</b> | C309 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                |                     |      |
| C309.1                    | Formulate an efficient problem space for a problem expressed.  |                     |      |
| C309.2                    | Select a search algorithm for a problem and estimate its time. |                     |      |
| C309.3                    | Representing knowledge using the appropriate technique.        |                     |      |
| C309.4                    | Apply AI techniques to solve problems of game playing.         |                     |      |
| C309.5                    | Act on uncertain problem solving.                              |                     |      |

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| <b>Semester No:</b>       | 6                                                                         |                     |      |
| <b>Course Title:</b>      | Data Analytics                                                            | <b>Course Code:</b> | C310 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                           |                     |      |
| 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      |                     |      |

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| <b>Semester No:</b>       | 6                                                                                                                           |                     |      |
| <b>Course Title:</b>      | Natural Language Processing                                                                                                 | <b>Course Code:</b> | C311 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                                                             |                     |      |
| 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                                                                              |                     |      |

Professional Elective–II

**Department of CSE [Artificial Intelligence & Machine Learning]**

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|---------------------------|-------------------------------------------------------------------------------|---------------------|------|
| <b>Semester No:</b>       | 6                                                                             |                     |      |
| <b>Course Title:</b>      | Software Testing Methodologies(PE-II)                                         | <b>Course Code:</b> | C312 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                               |                     |      |
| 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). |                     |      |

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| <b>Semester No:</b>       | 6                                                                             |                     |      |
| <b>Course Title:</b>      | Information Retrieval Systems(PE-II)                                          | <b>Course Code:</b> | C312 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                               |                     |      |
| 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                |                     |      |

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| <b>Semester No:</b>       | 6                                                                           |                     |      |
| <b>Course Title:</b>      | Pattern Recognition(PE-II)                                                  | <b>Course Code:</b> | C312 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                             |                     |      |
| 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                         |                     |      |

**Department of CSE [Artificial Intelligence & Machine Learning]**

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| <b>Semester No:</b>       | 6                                                                           |                     |      |
| <b>Course Title:</b>      | Computer Vision and Robotics(PE-II)                                         | <b>Course Code:</b> | C312 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                             |                     |      |
| 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.                    |                     |      |

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| <b>Semester No:</b>       | 6                                                            |                     |      |
| <b>Course Title:</b>      | Data Warehousing and Business Intelligence(PE-II)            | <b>Course Code:</b> | C312 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                              |                     |      |
| 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

|                           |                                                                   |                     |      |
|---------------------------|-------------------------------------------------------------------|---------------------|------|
| <b>Semester No:</b>       | 6                                                                 |                     |      |
| <b>Course Title:</b>      | Fundamentals of Internet of Things(OE-1)                          | <b>Course Code:</b> | C313 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                   |                     |      |
| 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                           |                     |      |

**Department of CSE [Artificial Intelligence & Machine Learning]**

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|---------------------------|-------------------------------------------------------------|---------------------|------|
| <b>Semester No:</b>       | 6                                                           |                     |      |
| <b>Course Title:</b>      | Data Analytics Lab                                          | <b>Course Code:</b> | C314 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                             |                     |      |
| 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.       |                     |      |

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| <b>Semester No:</b>       | 6                                                           |                     |      |
| <b>Course Title:</b>      | Advanced English<br>Communication Skill lab                 | <b>Course Code:</b> | C315 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                             |                     |      |
| 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.    |                     |      |

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|---------------------------|---------------------------------------------------------|---------------------|------|
| <b>Semester No:</b>       | 6                                                       |                     |      |
| <b>Course Title:</b>      | Natural Language Processing<br>Lab                      | <b>Course Code:</b> | C316 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                         |                     |      |
| 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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| <b>Semester No:</b>       | 6                                                                                                                                                 |                     |      |
| <b>Course Title:</b>      | Industrial Oriented Mini Project/Internship/Skill Development Course(DevOps)                                                                      | <b>Course Code:</b> | C317 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                                                                                   |                     |      |
| 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                                 |                     |      |

**Department of CSE [Artificial Intelligence & Machine Learning]**

IV YEAR

|                           |                                                                    |                     |      |
|---------------------------|--------------------------------------------------------------------|---------------------|------|
| <b>Semester No:</b>       | 7                                                                  |                     |      |
| <b>Course Title:</b>      | Professional Practice, Law & Ethics                                | <b>Course Code:</b> | C401 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                    |                     |      |
| 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                  |                     |      |

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| <b>Semester No:</b>       | 7                                                           |                     |      |
| <b>Course Title:</b>      | Deep Learning                                               | <b>Course Code:</b> | C402 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                             |                     |      |
| C402.1                    | Understand Machine Learning basics and neural networks.     |                     |      |
| C402.2                    | Disseminate optimal usage of data for training deep models. |                     |      |
| C402.3                    | Apply CNN and RNN models for real –world data.              |                     |      |
| C402.4                    | Evaluate deep models.                                       |                     |      |
| C402.5                    | Develop deep models for real-world problems.                |                     |      |

Professional Elective-III

|                           |                                                                                                                                    |                     |      |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------|---------------------|------|
| <b>Semester No:</b>       | 7                                                                                                                                  |                     |      |
| <b>Course Title:</b>      | Internet of Things(PE-III)                                                                                                         | <b>Course Code:</b> | C403 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                                                                    |                     |      |
| 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.                                              |                     |      |

**Department of CSE [Artificial Intelligence & Machine Learning]**

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| <b>Semester No:</b>       | 7                                                                               |                     |      |
| <b>Course Title:</b>      | Data Mining(PE-III)                                                             | <b>Course Code:</b> | C403 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                 |                     |      |
| 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.     |                     |      |

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| <b>Semester No:</b>       | 7                                                             |                     |      |
| <b>Course Title:</b>      | Go Programming(PE-III)                                        | <b>Course Code:</b> | C403 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                               |                     |      |
| 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.              |                     |      |

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| <b>Semester No:</b>       | 7                                                                         |                     |      |
| <b>Course Title:</b>      | Mobile Application Development(PE-III)                                    | <b>Course Code:</b> | C403 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                           |                     |      |
| 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.                          |                     |      |

**Department of CSE [Artificial Intelligence & Machine Learning]**

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| <b>Semester No:</b>       | 7                                                                                                                                                                            |                     |      |
| <b>Course Title:</b>      | Cloud Computing(PE-III)                                                                                                                                                      | <b>Course Code:</b> | C403 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                                                                                                              |                     |      |
| 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

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| <b>Semester No:</b>       | 7                                                         |                     |      |
| <b>Course Title:</b>      | Quantum Computing(PE-IV)                                  | <b>Course Code:</b> | C404 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                           |                     |      |
| 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. |                     |      |

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| <b>Semester No:</b>       | 7                                                              |                     |      |
| <b>Course Title:</b>      | Generative AI(PE-IV)                                           | <b>Course Code:</b> | C404 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                |                     |      |
| 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 |                     |      |

**Department of CSE [Artificial Intelligence & Machine Learning]**

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| <b>Semester No:</b>       | 7                                                                                  |                     |      |
| <b>Course Title:</b>      | Semantic Web(PE-IV)                                                                | <b>Course Code:</b> | C404 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                    |                     |      |
| 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,                                           |                     |      |

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| <b>Semester No:</b>       | 7                                                             |                     |      |
| <b>Course Title:</b>      | Nature Inspired Computing(PE-IV)                              | <b>Course Code:</b> | C404 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                               |                     |      |
| 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                          |                     |      |

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| <b>Semester No:</b>       | 7                                                 |                     |      |
| <b>Course Title:</b>      | Mobile Computing(PE-IV)                           | <b>Course Code:</b> | C404 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                   |                     |      |
| 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.     |                     |      |

**Department of CSE [Artificial Intelligence & Machine Learning]**

OPEN ELECTIVE-II

|                           |                                                                 |                     |      |
|---------------------------|-----------------------------------------------------------------|---------------------|------|
| <b>Semester No:</b>       | 7                                                               |                     |      |
| <b>Course Title:</b>      | Electronic Sensors(OE-II)                                       | <b>Course Code:</b> | C405 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                 |                     |      |
| C405.1                    | Describe sensor Principle, Classification and Characterization. |                     |      |
| C405.2                    | Explore the working of Electromechanical, Thermal Sensors       |                     |      |
| C405.3                    | Design aMagnetic sensors                                        |                     |      |
| C405.4                    | Use a system with sensors.                                      |                     |      |
| C405.5                    | Analyze the basic concepts of Smart Sensors.                    |                     |      |

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| <b>Semester No:</b>       | 7                                                                   |                     |      |
| <b>Course Title:</b>      | Deep Learning lab                                                   | <b>Course Code:</b> | C406 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                     |                     |      |
| 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

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| <b>Semester No:</b>       | 7                                                                                                                              |                     |      |
| <b>Course Title:</b>      | Internet of Things Lab                                                                                                         | <b>Course Code:</b> | C407 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                                                                |                     |      |
| 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.                                                                |                     |      |

**Department of CSE [Artificial Intelligence & Machine Learning]**

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| <b>Semester No:</b>       | 7                                                                                                                  |                     |      |
| <b>Course Title:</b>      | Data Mining Lab                                                                                                    | <b>Course Code:</b> | C407 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                                                    |                     |      |
| 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                                                                                   |                     |      |

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| <b>Semester No:</b>       | 7                                                     |                     |      |
| <b>Course Title:</b>      | Go Programming Lab                                    | <b>Course Code:</b> | C407 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                       |                     |      |
| 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.       |                     |      |

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| <b>Semester No:</b>       | 7                                                                        |                     |      |
| <b>Course Title:</b>      | Mobile Application Development Lab                                       | <b>Course Code:</b> | C407 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                          |                     |      |
| 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.             |                     |      |

**Department of CSE [Artificial Intelligence & Machine Learning]**

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| <b>Semester No:</b>       | 7                                                                                                               |                     |      |
| <b>Course Title:</b>      | Cloud computing lab                                                                                             | <b>Course Code:</b> | C407 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                                                 |                     |      |
| 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. |                     |      |

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

Professional Elective-V

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|---------------------------|--------------------------------------------------------------|---------------------|------|
| <b>Semester No:</b>       | 8                                                            |                     |      |
| <b>Course Title:</b>      | Social Network Analysis(PE-V)                                | <b>Course Code:</b> | C409 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                              |                     |      |
| 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                   |                     |      |

**Department of CSE [Artificial Intelligence & Machine Learning]**

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| <b>Semester No:</b>       | 8                                                                     |                     |      |
| <b>Course Title:</b>      | Federated Machine Learning(PE-V)                                      | <b>Course Code:</b> | C409 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                       |                     |      |
| 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              |                     |      |

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| <b>Semester No:</b>       | 8                                                             |                     |      |
| <b>Course Title:</b>      | Augmented Reality & Virtual Reality(PE-V)                     | <b>Course Code:</b> | C409 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                               |                     |      |
| 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.               |                     |      |

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| <b>Semester No:</b>       | 8                                                                   |                     |      |
| <b>Course Title:</b>      | Web Security(PE-V)                                                  | <b>Course Code:</b> | C409 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                     |                     |      |
| 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.                      |                     |      |

**Department of CSE [Artificial Intelligence & Machine Learning]**

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| <b>Semester No:</b>       | 8                                                                   |                     |      |
| <b>Course Title:</b>      | Ad-hoc & Sensor Networks(PE-V)                                      | <b>Course Code:</b> | C409 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                     |                     |      |
| 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

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| <b>Semester No:</b>       | 8                                                                                                                         |                     |      |
| <b>Course Title:</b>      | Speech and Video Processing(PE-VI)                                                                                        | <b>Course Code:</b> | C410 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                                                           |                     |      |
| 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 |                     |      |

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| <b>Semester No:</b>       | 8                                                                      |                     |      |
| <b>Course Title:</b>      | Robotic Process Automation(PE-VI)                                      | <b>Course Code:</b> | C410 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                        |                     |      |
| 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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| <b>Semester No:</b>       | 8                                                                        |                     |      |
| <b>Course Title:</b>      | Randomized Algorithms(PE-VI)                                             | <b>Course Code:</b> | C410 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                          |                     |      |
| 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.                                |                     |      |

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| <b>Semester No:</b>       | 8                                                                        |                     |      |
| <b>Course Title:</b>      | Cognitive Computing(PE-VI)                                               | <b>Course Code:</b> | C410 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                          |                     |      |
| 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.                |                     |      |

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| <b>Semester No:</b>       | 8                                                                                                                                        |                     |      |
| <b>Course Title:</b>      | Conversational AI(PE-VI)                                                                                                                 | <b>Course Code:</b> | C410 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                                                                          |                     |      |
| 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.                                                                      |                     |      |

**Department of CSE [Artificial Intelligence & Machine Learning]**

OPEN ELECTIVE- III

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|---------------------------|--------------------------------------------------------------|---------------------|------|
| <b>Semester No:</b>       | 8                                                            |                     |      |
| <b>Course Title:</b>      | Data Visualization using Python(OE-III)                      | <b>Course Code:</b> | C411 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                              |                     |      |
| 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.              |                     |      |

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| <b>Semester No:</b>       | 8                                                                                          |                     |      |
| <b>Course Title:</b>      | Project Stage–II including Seminar                                                         | <b>Course Code:</b> | C412 |
| <b>Course Outcome No.</b> | <b>Course Outcome Statement</b>                                                            |                     |      |
| 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.                                            |                     |      |