



R.M.K. ENGINEERING COLLEGE
RSM Nagar, Kavaraipettai – 601 206



Department of Artificial Intelligence and Data Science

Course Outcomes
ODD Semester 2022-23

| Sl. No. | Semester | Theory/ Practical | Course Code / Course Name |
|---------|----------|----------------------|---|
| 1) | 3 | Theory | 20MA305-Linear Algebra |
| 2) | 3 | Theory | 20AI301-Digital Principles and Computer Architecture |
| 3) | 3 | Theory | 20AI302-Introduction to Data Science (Lab Integrated) |
| 4) | 3 | Theory | 20CS302-Object Oriented Programming |
| 5) | 3 | Theory | 20IT403-Database Management Systems |
| 6) | 3 | Theory | 20GE301-Universal Human Values-II: Understanding Harmony |
| 7) | 3 | Practical | 20CS311-Object Oriented Programming Laboratory |
| 8) | 3 | Practical | 20IT412-Database Management Systems Laboratory |
| 9) | 3 | Practical | 20AI311-Mini Project |
| 10) | 3 | Practical | 20CS313-Aptitude and Coding Skills - I |
| 11) | 5 | Theory | 20MA302-Discrete Mathematics |
| 12) | 5 | Theory | 20AI501-Data Exploration and Visualization (Lab Integrated) |
| 13) | 5 | Theory | 20AI502-Machine Learning |
| 14) | 5 | Theory | 20CS403-Internet Programming |
| 15) | 5 | Theory | 20CS501-Computer Networks |
| 16) | 5 | Theory | 20CE003-Geographic Information System |
| 17) | 5 | Practical | 20AI511-Machine Learning Laboratory |
| 18) | 5 | Practical | 20CS411-Internet Programming Laboratory |
| 19) | 5 | Practical | 20CS512-Advanced Aptitude and Coding Skills – I |
| 20) | 5 | Practical | 20CS513-Mini Project and Design Thinking Practices Laboratory |

EVEN Semester 2022-23

| Sl. No. | Semester | Theory/ Practical | Course Code / Course Name |
|---------|----------|----------------------|--|
| 1) | 4 | Theory | 20MA402-Probability and Statistics |
| 2) | 4 | Theory | 20AI401-Artificial Intelligence |
| 3) | 4 | Theory | 20AI402-Data Analytics |
| 4) | 4 | Theory | 20AI403-Object Oriented Software Engineering |
| 5) | 4 | Theory | 20AI404-Operating System Fundamentals (Lab Integrated) |
| 6) | 4 | Theory | 20CS402-Design and Analysis of Algorithms |
| 7) | 4 | Practical | 20AI411-Artificial Intelligence Laboratory |
| 8) | 4 | Practical | 20AI412-Data Analytics Laboratory |
| 9) | 4 | Practical | 20AI413-Internship |
| 10) | 4 | Practical | 20CS414-Aptitude and Coding Skills – II |
| 11) | 6 | Theory | 20AI601-Business Analytics |
| 12) | 6 | Theory | 20AI602-Data and Information Security |
| 13) | 6 | Theory | 20AI603-Distributed and Cloud Computing (Lab integrated) |
| 14) | 6 | Theory | 20AI604-Knowledge Engineering |
| 15) | 6 | Theory | Professional Elective II |
| 16) | 6 | Theory | Professional Elective III |
| 17) | 6 | Practical | 20AI611-Knowledge Engineering Laboratory |
| 18) | 6 | Practical | 20AI612-Smart Mobile Application Development Laboratory |
| 19) | 6 | Practical | 20AI613-Internship |
| 20) | 6 | Practical | 20CS614-Advanced Aptitude and Coding Skills – II |

ODD Semester 2022-23

3rd Semester – B.Tech. Artificial Intelligence and Data Science

| 20MA305-Linear Algebra | |
|------------------------|---|
| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Test the consistency and solve the system of linear equations. |
| CO2 | Identify the bases and dimensions of vector space. |
| CO3 | Demonstrate the accurate and efficient use of advanced algebraic techniques. |
| CO4 | Compute orthonormal basis of inner product space and least squares approximation. |
| CO5 | Evaluate the eigenvalues of a matrix using numerical techniques and perform matrix decomposition. |

| 20AI301-Digital Principles and Computer Architecture | |
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| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Design digital circuits using simplified boolean functions. |
| CO2 | Design combinational circuits and sequential circuits |
| CO3 | Interpret the basic structure and operation of a computer, instructions and addressing mode. |
| CO4 | Construct a basic processor with pipeline. |
| CO5 | Evaluate the memory hierarchical system including cache memory and virtual memory. |
| CO6 | Differentiate the different ways of communicating with I/O devices and I/O interfaces. |

| 20AI302-Introduction to Data Science (Lab Integrated) | |
|---|--|
| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Explain the fundamentals of data science |
| CO2 | Experiment python libraries for data science |
| CO3 | Apply and implement basic classification algorithms |
| CO4 | Implement clustering and outlier detection approaches |
| CO5 | Present and interpret data using visualization tools in Python |

| 20CS302-Object Oriented Programming | |
|-------------------------------------|--|
| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Explain the object oriented programming concepts and fundamentals of Java |
| CO2 | Develop Java programs with the packages, inheritance, interfaces and exceptions |
| CO3 | Build Java applications with I/O streams, threads and generics classes |
| CO4 | Apply strings and collections in applications |
| CO5 | Develop interactive Java applications using swings and event handling mechanism |

20IT403-Database Management Systems

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| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Implement SQL and effective relational database design concepts. |
| CO2 | Map ER model to Relational model to perform database design effectively. |
| CO3 | Compare and contrast various indexing strategies in different database systems. |
| CO4 | Implement queries using normalization criteria and optimization techniques. |
| CO5 | Analyse how advanced databases differ from traditional databases. |
| CO6 | Design and deploy an efficient and scalable data storage node for varied kind of application requirements. |

20GE301-Universal Human Values-II: Understanding Harmony

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|-----|---|
| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Would become more aware of themselves, and their surroundings (family, society, nature); |
| CO2 | Would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind. |
| CO3 | Would have better critical ability. |
| CO4 | Would become sensitive to their commitment towards what they have understood (human values, human relationship and human society). |
| CO5 | Would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction. |

Laboratory

20CS311-Object Oriented Programming Laboratory

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|-----|---|
| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Develop and implement Java programs for simple applications that make use of classes, packages and interfaces. |
| CO2 | Develop and implement Java programs with collections, exception handling, regular expressions and multithreading. |
| CO3 | Design applications using file processing and event handling |

20IT412-Database Management Systems Laboratory

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| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Apply typical data definitions and manipulation commands. |
| CO2 | Design applications to test Nested and Join Queries. |
| CO3 | Implement simple applications that use Views. |
| CO4 | Implement applications that require a Front-end Tool. |
| CO5 | Critically analyze the use of Tables, Views, Functions and Procedures. |

20AI311-Mini Project

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|-----|---|
| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Define the problem statement, study of requirements; study related Literature and the possible feasibilities. |
| CO2 | Demonstrate a sound technical knowledge of their selected project domain. |
| CO3 | Analyze the problem statement and design the architecture and modules for the proposed system |
| CO4 | Implement the problem and test the project with various test cases |
| CO5 | Demonstrate the knowledge, skills and attitudes of a software professional |
| CO6 | To take up challenging real world problems and find solution using appropriate methodology. |

20CS313-Aptitude and Coding Skills - I

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| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | CO1: Develop vocabulary for effective communication and reading skills. |
| CO2 | CO2: Build the logical reasoning and quantitative skills. |
| CO3 | CO3: Develop error correction and debugging skills in programming. |

5th Semester – B.Tech. Artificial Intelligence and Data Science

20MA302-Discrete Mathematics

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| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Examine the validity of the arguments. |
| CO2 | Demonstrate various proof techniques and application of principles. |
| CO3 | Apply graph theory techniques to solve real life problems. |
| CO4 | Identify algebraic techniques to formulate and solve group theoretic problems. |
| CO5 | Utilize the significance of lattices and Boolean algebra in computer science and engineering. |

20AI501-Data Exploration and Visualization (Lab Integrated)

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| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Explain the overview of exploratory data analysis and phases involved in data analytics. |
| CO2 | Explore in-depth knowledge in EDA techniques. |
| CO3 | Apply the visualization techniques in data. |
| CO4 | Describe the methods of time series analysis. |
| CO5 | Represent the data in tree and hierarchical formats. |

20AI502-Machine Learning

COs **Course Outcome : The students, after the completion of the course, are expected to**

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CO1 Explain the basics of Machine Learning and Supervised Algorithms.

CO2 Understand the various classification algorithms.

CO3 Study dimensionality reduction techniques.

CO4 Elaborate on unsupervised learning techniques.

CO5 Understand various Graphical models and understand the basics of reinforcement learning.

20CS403-Internet Programming

COs **Course Outcome : The students, after the completion of the course, are expected to**

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CO1 Construct a basic website using HTML and Cascading Style Sheets.

CO2 Build dynamic web page with validation using Java Script objects and by applying different event handling mechanisms.

CO3 Develop server side programs using Servlets and JSP.

CO4 Construct simple web pages in PHP and to represent data in XML format.

CO5 Apply AJAX and web services to develop interactive web applications.

20CS501-Computer Networks

COs **Course Outcome : The students, after the completion of the course, are expected to**

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CO1 Understand the fundamental concepts of computer networks and physical layer.

CO2 Gain knowledge of various protocols and techniques used in the data link layer.

CO3 Learn the network layer services and network layer protocols.

CO4 Understand the various protocols used in the transport layer.

CO5 Analyze the various application layer protocols.

20CE003-Geographic Information System

COs **Course Outcome : The students, after the completion of the course, are expected to**

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CO1 Describe the fundamentals of maps and their characteristics, GIS & its components.

CO2 Demonstrate various spatial data models and their advantages.

CO3 Identify GIS Data sources, data input, data editing and conversion.

CO4 Carryout raster and vector data analysis for various applications.

CO5 Explain the spatial information along with quality assessment for applications.

CO6 Identify an error free GIS database for civil engineering applications.

Laboratory

20AI511-Machine Learning Laboratory

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| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Analyse supervised, unsupervised or semi-supervised learning algorithms for any given problem. |
| CO2 | Apply the appropriate linear models for any given problem. |
| CO3 | Understand the foundation of probabilistic models and apply unsupervised algorithms for clustering. |
| CO4 | Select the appropriate graphical models of machine learning. |
| CO5 | Apply deep learning algorithms to improve efficiency. |

20CS411-Internet Programming Laboratory

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|-----|---|
| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Create web pages using HTML/XML and style sheets. |
| CO2 | Design user interfaces using Java frames and applets. |
| CO3 | Develop dynamic web pages using server-side scripting and PHP programming. |
| CO4 | Build applications with AJAX. |

20CS512-Advanced Aptitude and Coding Skills – I

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|-----|---|
| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Develop vocabulary for effective communication and reading skills. |
| CO2 | Build the logical reasoning and quantitative skills. |
| CO3 | Develop error correction and debugging skills in programming. |

20CS513-Mini Project and Design Thinking Practices Laboratory

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| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Understand the design thinking process and able to visualize the problem. |
| CO2 | Analyse the problem using innovation tools. |
| CO3 | Design a prototype for an identified problem solution. |
| CO4 | Testing and evaluate strategies in improving the solution. |
| CO5 | Apply the innovation ideas to real-world applications. |

EVEN Semester 2022-23

4th Semester – B.Tech. Artificial Intelligence and Data Science

| 20MA402-Probability and Statistics | |
|------------------------------------|---|
| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Understand the fundamental knowledge of modern probability theory and standard distributions. |
| CO2 | Categorize the probability models and function of random variables based on one and two dimensional random variables. |
| CO3 | Employ the concept of testing the hypothesis in real life problems. |
| CO4 | Implement the analysis of variance for real life problems. |
| CO5 | Apply the statistical quality control in engineering and management problems. |

| 20AI401-Artificial Intelligence | |
|---------------------------------|--|
| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Explain the foundations of AI and various Intelligent agents |
| CO2 | Apply search strategies in problem solving and game playing |
| CO3 | Explain logical agents and first-order logic |
| CO4 | Apply problem-solving strategies with knowledge representation mechanism for solving hard problems |
| CO5 | Describe the basics of learning and expert systems. |

| 20AI402-Data Analytics | |
|------------------------|--|
| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Explain the fundamentals of big data and data analytics |
| CO2 | Discuss the Hadoop framework |
| CO3 | Explain about exploratory data analysis and data manipulation tools |
| CO4 | Analyse and interpret streaming data |
| CO5 | Illustrate various applications of data analytics |

| 20AI403-Object Oriented Software Engineering | |
|--|--|
| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Summarize software engineering principles and activities involved in building large software programs. |
| CO2 | Describe the process of requirements gathering, analysis and unified modelling |
| CO3 | Apply the object oriented design process. |
| CO4 | Analyse the various traditional and object oriented testing methods |

CO5 Apply estimation techniques, schedule project activities and compute pricing.

20AI404-Operating System Fundamentals

COs **Course Outcome : The students, after the completion of the course, are expected to**

CO1 Implement the operating system concepts and process

CO2 Analyse various CPU scheduling algorithms and thread mechanism

CO3 Implement process synchronization and deadlock problems

CO4 Design various page replacement techniques to given situation

CO5 Implement various disk scheduling techniques

20CS402-Design and Analysis of Algorithms

COs **Course Outcome : The students, after the completion of the course, are expected to**

CO1 Analyse the efficiency of recursive and non-recursive algorithms mathematically

CO2 Analyse the efficiency of brute force, divide and conquer, decrease and conquer, Transform and conquer algorithmic techniques

CO3 Implement and analyse the problems using dynamic programming and greedy technique algorithmic techniques.

CO4 Solve the problems using iterative improvement technique for optimization.

CO5 Compute the limitations of algorithmic power and solve the problems using backtracking and branch and bound technique.

Laboratory

20AI411-Artificial Intelligence Laboratory

COs **Course Outcome : The students, after the completion of the course, are expected to**

CO1 Implement search strategies

CO2 Implement and execute gaming algorithms

CO3 Design programs for Constraint satisfaction problems

CO4 Experiment the simple projects using AI Concepts

20AI412-Data Analytics Laboratory

COs **Course Outcome : The students, after the completion of the course, are expected to**

CO1 Setup multi-node Hadoop Clusters

CO2 Apply Map Reduce algorithms for problems

CO3 Perform data analysis with machine learning models.

CO4 Perform graphical data analysis.

CO5 Build large datasets using Hbase, Mongo DB.

20CS414-Aptitude and Coding Skills – II

COs **Course Outcome : The students, after the completion of the course, are expected to**

CO1 Develop advanced vocabulary for effective communication and reading skills.

CO2 Build an enhanced level of logical reasoning and quantitative skills.

CO3 Develop error correction and debugging skills in programming.

CO4 Apply data structures and algorithms in problem solving.

6th Semester – B.Tech. Artificial Intelligence and Data Science

20AI601-Business Analytics

COs **Course Outcome : The students, after the completion of the course, are expected to**

CO1 Understand of how managers use business analytics to formulate and solve business problems.

CO2 Develop and deploy Business Analytic Models.

CO3 Understand the business analytics at analytical and warehouse level.

CO4 Analyze the various predictive analytics methods in business.

CO5 Analyze the various prescriptive analytics methods in business.

20AI602-Data and Information Security

COs **Course Outcome : The students, after the completion of the course, are expected to**

CO1 Implement basic security algorithms required by any computing system.

CO2 Analyze the vulnerabilities in any computing system and hence be able to design a security solution.

CO3 Analyze the possible security attacks in complex real time systems and their effective counter measures.

CO4 Identify the security issues in the network and resolve it.

CO5 Evaluate security mechanisms using rigorous approaches, including theoretical derivation, modelling, and simulations.

20AI603-Distributed and Cloud Computing (Lab integrated)

COs **Course Outcome : The students, after the completion of the course, are expected to**

CO1 Articulate the main concepts and key technologies of cloud computing.

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| CO2 | Learn various cloud services and platforms to cater the requirements in the growth of the businesses. |
| CO3 | Develop the ability to understand the cloud infrastructure and virtualization that help in the development of cloud. |
| CO4 | Explain the high-level automation and orchestration systems that manage the virtualized infrastructure. |
| CO5 | Summarizes the programming paradigms used in cloud and how cloud software deployments scale to large numbers of users. |

| 20AI604-Knowledge Engineering | |
|--------------------------------------|--|
| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Understand the basics of Knowledge Engineering. |
| CO2 | Discuss reasoning under uncertainty. |
| CO3 | Design and develop ontologies. |
| CO4 | Apply reasoning with ontologies and rules. |
| CO5 | Understand learning and rule learning. |

Laboratory

| 20AI611-Knowledge Engineering Laboratory | |
|---|--|
| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Represent Knowledge for various domains. |
| CO2 | Implement an Expert System. |
| CO3 | Develop Ontologies for a given domain. |
| CO4 | Develop Fuzzy Rule based Systems. |
| CO5 | Apply classification algorithms. |

| 20AI612-Smart Mobile Application Development Laboratory | |
|--|--|
| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Develop mobile applications using GUI and Layouts. |
| CO2 | Develop mobile applications using Event Listener. |
| CO3 | Develop mobile applications using Databases. |
| CO4 | Develop mobile applications using RSS Feed, Internal/External Storage, SMS, Multi-threading and GPS. |
| CO5 | Analyze and discover an own smart mobile app for simple needs. |

20CS614-Advanced Aptitude and Coding Skills – II

COs Course Outcome : The students, after the completion of the course, are expected to

CO1 Develop advanced vocabulary for effective communication and reading skills.

CO2 Build an enhanced level of logical reasoning and quantitative skills.

CO3 Develop error correction and debugging skills in programming.

CO4 Apply data structures and algorithms in problem solving.
