CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY
An Autonomous Institute | Affiliated to Osmania University
Kokapet Village, Gandipet Mandal, Hyderabad, Telangana-500075, www.cbit.ac.in

Approved by | Recognized Research Centers | Programs Accredited by | Grade A++ in NAAC | All India Ranking 151-200 Band nirf | ISO Certifications: Quality Audit 9001 : 2015, Green Audit 14001 : 2015, Energy Audit 50001 : 2018

DEPARTMENT OF ARTIFICIAL INTELLIGENCE & DATA SCIENCE

COURSE OUTCOMES

COURSE OUTCOME STATEMENTS OF THE COURSES OF REGULATIONS

R-22

B.E. (AI&DS)

Dr. KADIYALA RAMANA
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DEPARTMENT OF ARTIFICIAL INTELLIGENCE & DATA SCIENCE

INSTITUTE VISION

"To be the center of excellence in technical education and research".

INSTITUTE MISSION

"To address the emerging needs through quality technical education and advanced research".

DEPARTMENT VISION

"To be a globally recognized center of excellence in the field of Artificial Intelligence and Data Science that produces innovative pioneers and research experts capable of addressing complex real-world challenges and contributing to the socio-economic development of the nation."

DEPARTMENT MISSION

1. **To provide cutting-edge education in the field of Artificial Intelligence and Data Science that is rooted in ethical and moral values.**
2. **To establish strong partnerships with industries and research organizations in the field of Artificial Intelligence and Data Science, and to excel in the emerging areas of research by creating innovative solutions.**
3. **To cultivate a strong sense of social responsibility among students, fostering their inclination to utilize their knowledge and skills for the betterment of society.**
4. **To motivate and mentor students to become trailblazers in Artificial Intelligence and Data Science, and develop an entrepreneurial mindset that nurtures innovation and creativity.**

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PROGRAM EDUCATIONAL OBJECTIVES (PEOs):

Graduates of AI & DS will be able to:

1. Adapt emerging technologies of Artificial Intelligence & Data Science and develop state of the art solutions in the fields of Manufacturing, Agriculture, Health-care, Education, and Cyber Security.
2. Exhibit professional leadership qualities to excel in interdisciplinary domains.
3. Possess human values, professional ethics, application-oriented skills, and engage in lifelong learning.
4. Contribute to the research community to meet the needs of public and private sectors.

PROGRAM SPECIFIC OUTCOMES (PSOs):

After successful completion of the program, students will be able to:

1. Exhibit proficiency of Artificial Intelligence and Data Science in providing sustainable solutions by adapting to societal, environmental and ethical concerns to real world problems.
2. Develop professional skills in the thrust areas like ANN and Deep learning, Robotics, Internet of Things and Big Data Analytics.
3. Pursue higher studies in Artificial Intelligence and Data Science in reputed Universities and to work in research establishments.

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I. B.E.(AI&DS)Course Outcome Statements : R-22 Regulation

S.NO.	Course Code	Name of the Course	Course Outcomes
2022-23 - I Semester			
1.	22MTC01	Linear Algebra & Calculus	• Determine the extreme values of functions of two variables. • Apply the vector differential operator to scalar and vector functions • Solve line, surface & volume integrals by Greens, Gauss and Stoke's theorems. • Determine the basis and dimension of a vector space, compute linear transformation. • Apply the Matrix Methods to solve the system of linear equations
2.	22PYC01	Optics and Semiconductor Physics	• Demonstrate the physical properties of light. • Explain characteristic properties of lasers and fiber optics. • Find the applications of quantum mechanics • Classify the solids depending upon electrical conductivity. • Identify different types of semiconductors
3	22CSC01	Problem Solving And Programming	• Understand real world problems and develop computer solutions for those problems. • Understand the basics of Python. • Apply Python for solving basic programming solutions. • Create algorithms/flowcharts for solving real-time problems. • Build and manage dictionaries to manage data. • Handle data using files.
4	22EGC01	English	• Illustrate the nature, process and types of communication and communicate effectively without barriers. • Construct and compose coherent paragraphs, emails and adhering to appropriate mobile etiquette. • Apply techniques of precision to write a précis and formal letters by using acceptable grammar and appropriate vocabulary. • Distinguish formal from informal reports and demonstrate advanced writing skills by drafting formal reports. • Critique passages by applying effective reading techniques.

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5	22PYC03	Optics And Semiconductor Physics Lab	• Interpret the errors in the results of an experiment. • Demonstrate physical properties of light experimentally. • Make use of lasers and optical fibers for engineering applications • Explain the V-I characteristics of some optoelectronic and semiconductor devices • Find the applications of thermistor
6	22EGC02	English Lab	• Define the speech sounds in English and understand the nuances of pronunciation in English • Apply stress correctly and speak with the proper tone, intonation and rhythm. • Analyze listening comprehension texts to enhance their listening skills. • Determine the context and speak appropriately in various situations. • Design and present effective posters while working in teams, and discuss and participate in Group discussions.
7	22CSC02	Problem Solving and Programming Lab	• Understand various Python program development Environments. • Demonstrate the concepts of Python. • Implement algorithms/flowcharts using Python to solve real-world problems. • Build and manage dictionaries to manage data. • Write Python functions to facilitate code reuse. • Use Python to handle files and memory.
8	22MEC01	Cad And Drafting	• Become conversant with appropriate use of CAD software for drafting. • Recognize BIS, ISO Standards and conventions in Engineering Drafting. • Construct the projections of points, lines, planes, solids • Analyse the internal details of solids through sectional views • Create an isometric projections and views
9	22MEC38	Digital Fabrication Lab	• Understand safety measures to be followed in workshop to avoid accidents. • Identify various tools used in carpentry, house wiring and plumbing. • Make a given model by using workshop trades like carpentry, plumbing, House wiring and 3d modeling using solid works software for Additive Manufacturing. • Perform pre-processing operations on STL files for 3D printing, also understand reverse engineering process. • Conceptualize and produce simple

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			device/mechanism of their choice.
2022-23 - II Semester			
1	22MTC04	Differential Equations & Numerical Methods	• Calculate the solutions of first order linear differential equations. • Calculate the solutions of higher order linear differential equations. • Solve the algebraic, transcendental and system of equations. • Apply interpolation and numerical differentiation techniques for given data. • Test the convergence and divergence of Infinite series
2	22CYC01	Chemistry	• Identify the microscopic chemistry in terms of molecular orbitals, intermolecular forces and rate of chemical reactions. • Discuss the properties and processes using thermodynamic functions, electrochemical cells and their role in batteries and fuel cells. • Illustrate the major chemical reactions that are used in the synthesis of organic molecules. • Classify the various methods used in treatment of water for domestic and industrial use. • Outline the synthesis of various Engineering materials & Drugs.
3	22EEC01	Basic Electrical Engineering	• Understand the concepts of Kirchhoff's laws and their application various theorems to get solution of simple dc circuits. • Predict the steady state response of RLC circuits with AC single phase/three phase supply. • Infer the basics of single phase transformer • Describe the construction, working principle of DC machine and 3-phase Induction motor. • Acquire the knowledge of electrical wires, cables, earthing, Electrical safety precautions to be followed in electrical installations and electric shock and its safety and energy calculations.
4	22CSC03	Object Oriented Programming	• Understand the concepts of Object-Oriented features. • Apply OOPs concepts and different libraries to solve programming problems. • Understand the advanced concepts of Python. • Develop programs to access databases and

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			web data. • Understand APIs and third-party libraries to be used with Python.
5	22CYC02	Chemistry Lab	• Identify the basic chemical methods to analyse the substances quantitatively & qualitatively. • Estimate the amount of chemical substances by volumetric analysis. • Determine the rate constants of reactions from concentration of reactants/ products as a function of time. • Calculate the concentration and amount of various substances using instrumental techniques. • Develop the basic drug molecules and polymeric compounds.
6	22MBC02	Community Engagement	• Gain an understanding of Rural life, Culture and Social realities. • Develop a sense of empathy and bonds of mutuality with Local Communities. • Appreciate significant contributions of Local communities to Indian Society and Economy. • Exhibit the knowledge of Rural Institutions and contributing to Community's Socio-Economic improvements. • Utilize the opportunities provided by Rural Development Programs.
7	22CSC04	Object-Oriented Programming Lab	• Demonstrate the features of Object-Oriented Programming. • Understand APIs and third-party libraries to be used with Python. • Use Python libraries to solve real-world problems. • Write scripts to solve data science/machine leaning problems using NumPy and Pandas. • Develop applications by accessing web data and databases.
8	22MEC37	Robotics And Drones Lab	• Demonstrate knowledge of the relationship between mechanical structures of robotics and their operational workspace characteristics • Understand mechanical components, motors, sensors and electronic circuits of robots and build robots. • Demonstrate knowledge of robot controllers. • Use Linux environment for robotic programming.

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			• Write Python scripts to control robots using Python and Open CV.
9	22EEC02	Basic Electrical Engineering Lab	• Comprehend the circuit analysis techniques using various circuital laws and theorems. • Analyse the parameters of the given coil and measurement of power and energy in AC circuits • Determine the turns ration/performance parameters of single-phase transformer • Infer the characteristics of DC shunt motor different tests. • Illustrate different parts and their function of electrical components, equipment and machines
2023-24 - III Semester			
1	22MTC07	Mathematical and Statistical Foundations	• Apply the statistical averages for identifying behaviour of the data. • Analyse the data using probabilistic models. • Apply the probability function to characterise the random phenomenon. • Analyse data using different methods of hypothesis testing. • Apply the number theory concept to cryptography domain.
2	22CSC15	Operating Systems	• Understand the basics of Operating systems and its major components. • Illustrate the concepts related to process management. • Distinguish various memory management techniques. • Apply concepts of process synchronization and deadlocks to a given situation. • Evaluate various file allocation methods and Apply security as well as recovery features in the design Operating system..
3	22CSC11	Database Management Systems	• Design database schema for an application using RDBMS concepts. • Write SQL queries for tasks of various complexities. • Build applications using database system as backend. • Understand internal working of a DBMS including data storage, indexing, query processing, transaction processing, concurrency control and recovery mechanisms. • Analyze non-relational and

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			parallel/distributed data management systems with a focus on scalability.
4	22ITC01	Digital Logic And Computer Architecture	• Apply Boolean algebra for simplification and learn representation of data using numbers. • Understand fundamentals of combinational & sequential logic gates, registers and counters. • Infer the architecture and functionality of the central processing unit. • Explore the techniques that computers use to communicate with I/O devices for data transfer. • Comprehend memory hierarchy, cache memory and virtual memory
5	22ITC02	Java Programming	• Apply the concept of OOP to design, implement and execute programs. • Use the strings, interfaces, packages and inner classes for application development. Apply the exception handling mechanisms and multithreading for the development. • Develop applications using collection framework. • Develop database applications using SQL package.
6	22CSC05	Data Structures	• Understand the basic concepts and types of data structures. • Analyze various linear and nonlinear data structures. • Identify the applications of linear and nonlinear data structures and significance of balanced search trees, hashing. • Evaluate various searching and sorting techniques. • Use appropriate data structures to design efficient algorithms.
7	22EGM01	Indian Constitution And Fundamental Principles	• Understand the history of framing of the Indian Constitution and its features. 2. • Assess the realization of Fundamental Rights and Directive Principles of State Policy. • Analyze the challenges to federal system and position of the President and the Prime Minister in the Union Government. • Underline the role of the Legislature and the Judiciary in Union Government and their mutual relations. • Evolve the development of the local governments in India and assess the role of Collector in district administration.

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8	22CSC33	Database Management Systems Lab	• Outline the built-in functions of SQL and apply these functions to write simple and complex queries using SQL operators. • Demonstrate Queries to Retrieve and Change Data using Select, Insert, Delete and Update. Construct Queries using Group By, Order By and Having Clauses. • Demonstrate Commit, Rollback, Save point commands, SQL Plus Reports and formulate the Queries for Creating, Dropping and Altering Tables, Views, constraints. • Develop queries using Joins, Sub-Queries and Working with Index, Sequence, Synonym, Controlling Access and Locking Rows for Update, Creating Password and Security features. 5. Develop PL/SQL code using Cursors, Exception, Composite Data Types and Procedures, Functions and Packages.
9	22ITC03	Java Programming Lab	• Practice the basics of OOPs to develop java applications. • Use the inheritance and interfaces for application development. • Apply the exception handling and multithreading to handle multiple flows of execution. • Develop applications using collection framework. • Apply the SQL concepts for application development.
10	22CSC31	Data Structures Lab	• Implement the abstract data type. • Implement linear and non-linear data structures. • Evaluate various sorting techniques. • Analyze various algorithms of linear and nonlinear data structures. • Choose or create appropriate data structures to solve real world problems.
11	22ADI01	Moocs / Training / Internship	• Learn new technologies and solve real time projects. • Expose to the industrial environment problems and technologies • Gain knowledge on contemporary technologies industrial requirements. • Identify, Design and Develop solutions for real world problems • Communicate their ideas and learning experiences through reports and presentation
2023-24 - IV Semester			

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1	22MTC16	Stochastic Process And Queuing Theory	• Estimate the marginal probabilities of statistical averages. • Distinguish the random process of auto correlation and cross correlation. • Characterize the random process of ensemble averages. • Analyze the effect the thermal noise in the system. • Analyze the queuing behavior of different queuing models.
2	22ECC39	Systems And Signal Processing	• Classify signals, analyse the signals using Transform techniques. • Evaluate signal characteristics in frequency domain. • Assess the system stability and causality using ROC and Pole-Zero Plot. • Classify systems and analyse the signals using Transform techniques • Describe and analyse the DT Signal/systems using DFT, DCT, DWT, FFT and Z-Transform.
3	22CSC14	Design And Analysis Of Algorithms	• Analyzing performance of algorithms using asymptotic notations. • Demonstrate familiarity with major algorithms and importance of algorithm design techniques. • Apply algorithm design techniques on different problems. • Analyze the efficiency of the algorithms. • Understanding limits of efficient computation with the help of complexity classes.
4	22ADC01	Fundamentals Of Machine Learning	• Explain the types of machine learning and handle the challenges of machine learning. • Construct Decision Trees, Measure performance of classifiers. • Apply Regression, Logistic Regression and gradient descent to solve problems. • Design solutions using Bayesian classifier, SVMs and Ensemble methods. • Perform Dimensionality reduction and clustering of data.
5	22MBC01	Engineering Economics And Accountancy	• Apply fundamental knowledge of Managerial Economics concepts and tools. • Analyze various aspects of Demand Analysis, Supply and Demand Forecasting. • Understand Production and Cost relationships to make best use of resources available. • Apply Accountancy Concepts and

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			Conventions and preparation of Final Accounts. • Evaluate Capital and Capital Budgeting decision based on any technique.
6	22CEM01	Environmental Science (Mandatory Course)	• Identify the natural resources and realise the importance of water, food, forest, mineral, energy, land resources and effects of over utilisation. • Understand the concept of ecosystems and realise the importance of interlinking of food chains. • Contribute for the conservation of bio-diversity. • Suggest suitable remedial measure for the problems of environmental pollution and contribute for the framing of legislation for protection of environment. • Follow the environmental ethics and contribute to the mitigation and management of environmental disasters.
7	22ITE02	Digital Image Processing (Professional Elective – I)	• Illuminate the fundamental concepts and applications of digital image processing techniques. • Demonstrate intensity transformations, spatial filtering, smoothing and sharpening in both spatial and frequency domains, image restoration concepts. • Demonstrate image restoration and morphological image processing methods. • Apply object recognition techniques by using image segmentation and image representation & description methods. Illustrate the various colour models and Application of image compression methods.
8	22ITE04	Mobile Application Development (Professional Elective – I)	• Understand the benefits of using Kotlin for Mobile application development. • Design user interface for mobile applications. • Use Intent, Broadcast receivers and Internet services in Android App. • Use multimedia, camera and Location based services in Android App. • Apply best practices to implement databases and publish apps on Playstore.
9	22ITC17	Web Technologies (Professional Elective – I)	• Create web pages with good aesthetic sense of design using HTML CSS3, Bootstrap and popular themes. • Use JS in Validations and DOM manipulation. • Design Schema and perform CRUD

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			operations from UI components. • Become an agile practitioner with the ability to quickly complete projects using ReactJS. • Build an end-to-end application from scratch using React JS, NODE JS, Express JS and Mongo DB.
10	22ADE01	Data Analysis And Visualization (Professional Elective – I)	• Use Numpy library utilities for various numerical operations. • Apply pandas library functions for handling data frames. • Perform various preprocessing operations on datasets using Pandas Series and Data Frame objects. • Analyze the given dataset and derive conclusions using inferential statistics. Apply 2-D and 3-D plotting techniques on datasets using matplotlib and seaborn
11	22ADE02	Data Warehousing And Data Mining	• Understand the concepts and issues of data mining, apply preprocessing techniques. • Build multidimensional data model and perform OLAP operations, generate association rules. • Evaluate various models for classification and prediction. • Analyze advanced classification methods and clustering techniques. • Understand outlier detection and real time applications of data mining.
12	22MTC17	Stochastic Process And Queuing Theory Lab	• Interpret the plots of statistical averages • Compute the measures of variation for stochastic data • Characterize the bivariate probability distribution of averages a • Analyze the probabilities using probability functions. • Analyze the queuing behavior of different queuing models.
13	22CSC34	Design And Analysis Of Algorithms Lab	• Implement greedy, dynamic programming, backtracking and branch and bound techniques. • Demonstrate various algorithmic design techniques. • Analyze the performance of various algorithms. • Compare various design strategies. • Formulate solutions to solve real world problems use acquired knowledge.

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14	22ADC02	Machine Learning Lab	• Perform dimensionality reduction of a dataset. • Build decision trees for classification. • Design solutions using SVM, KNN, Regression algorithms. • Perform clustering of data. • Use principle Component Analysis for feature Extraction.
15	22ADC04	Linux And Latex Lab	• Run various UNIX commands on a standard UNIX/LINUX Operating system • Understand the shell programming on UNIX OS • Typing of text including roman letters, alphabets, special symbols and mathematical symbols in LaTeX. • Display of equations in LaTeX. • Creating a table and drawing a figure in LateX

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