



CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)

Kokapet(Village), Gandipet, Hyderabad, Telangana-500075. www.cbit.ac.in



COMMITTED TO
RESEARCH,
INNOVATION AND
EDUCATION

44
years

R20

Department Vision

To be in the frontiers of Computer Science and Engineering with academic excellence and Research.

Department Mission

The mission of the Computer Science and Engineering Department is to:

1. Educate students with the best practices of Computer Science by integrating the latest research into the curriculum
2. Develop professionals with sound knowledge in theory and practice of Computer Science and Engineering
3. Facilitate the development of academia-industry collaboration and societal outreach programs
4. Prepare students for full and ethical participation in a diverse society and encourage lifelong learning

B.E. Program Outcomes (PO's)


Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization for the solution of complex engineering problems.

Problem analysis: Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.

Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling to complex engineering activities, with an understanding


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of the limitations.

The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

Communication: Communicate effectively on complex engineering activities with the engineering community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.


Life-long learning: Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM EDUCATION OBJECTIVES (PEOs): After the completion of the program, our:

1. Graduates will apply their knowledge and skills to succeed in their careers and/or obtain advanced degrees, provide solutions as entrepreneurs
2. Graduates will creatively solve problems, communicate effectively, and successfully function in multidisciplinary teams with superior work ethics and values
3. Graduates will apply principles and practices of Computer Science, mathematics and Science to successfully complete hardware and/or software-related engineering projects to meet customer business objectives and/or productively engage in research


PROGRAM SPECIFIC OUTCOMES (PSOs): At the end of the program

1. Graduates will acquire the practical competency in Computer Science and Engineering through emerging technologies and open-source platforms related to the domains
2. Graduates will design and develop innovative products by applying principles of computer science

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and engineering

3. Graduates will be able to successfully pursue higher education in reputed institutions and provide solutions as entrepreneurs.
4. Graduates will be able to work in multidisciplinary teams for career growth by exhibiting work ethics and values


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CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (Autonomous)**Gandipet, Hyderabad -75****Department of Computer Science and Engineering****Course Outcomes Statements for BE(AI&ML)-R20**

S.No	Course		Course Outcomes Statements
	Code	Name	
1.	20MTC01	LINEAR ALGEBRA & CALCULUS (M-I)	Apply the Matrix Methods to solve the system of linear equations.
			Test the convergence and divergence of the infinite Series.
			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.
2.	20PY C01	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.	20CSC01	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.	20EGC 01	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.



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			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
5.	20MT C02	LINEAR ALGEBRA & CALCULUS LAB	Apply the Matrix operations in executing various programmes.
			Test the convergence and divergence of the infinite Series.
			Explore the extreme values of functions of two variables.
			Determine the gradient, divergent and curl of scalar and vector point functions
			Solve line, surface & volume integrals by Greens, Gauss and Stoke's theorems
6.	20EGC 02	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 IELTS and TOEFL 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.	20PY C03	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 thermistor
8.	20CS C02	PROGRAMMING LAB - I	Understand various Python program development Environments.
			Demonstrate the concepts of Python.



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			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.
9.	20MEC01	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
10.	20MB C02	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.
			Utilise the opportunities provided by Rural Development Programmes.
11.	20MT C03	DIFFERENTIAL EQUATIONS & TRANSFORM THEORY	Calculate the solutions of first order linear differential equations.
			Calculate the solutions of higher order linear differential equations.
			Examine the series solutions for higher order differential equations.
			Evaluate the Improper integrals by Fourier Transform.
			Solve the difference equations by Z-transforms.
12.	20CYC01	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

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			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.
13.	20CS C05	INDUSTRY 4.0	Identify the key drivers and enablers of Industry4.0
			Describe the smartness in smart factories, smart cities, smart products, ad smart services
			Determine various systems used in manufacturing plants, and their role in an Industry 4.0world
			Illustrate the power of Cloud Computing in a networked economy
			Understand the opportunities, challenges, brought about by Industry 4.0 and how organizations and individuals should prepare to reap the benefits
14.	20CSC03	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 web data.
			Understand APIs and third-party libraries to be used with Python.
15.	20MT C03	DIFFERENTIAL EQUATIONS & TRANSFORM THEORY LAB	Explore all the possible solutions of first order differential equation.
			Analyse the solutions of higher order linear differential equations.
			Examine the series solutions for higher order differential equations.
			Evaluate the Improper integrals by Fourier Transform.
			Apply the Z-transform to solve the difference equations.
16.	20CYC02	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.



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			Develop the basic drug molecules and polymeric compounds.
17.	20CSC04	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 learning problems using NumPy and Pandas.
			Develop applications by accessing web data and databases.
18.	20ME C02	WORKSHOP / MANUFACTURING PRACTICE	Understand safety measures to be followed in workshop to avoid accidents.
			Identify various tools used in fitting, carpentry, tin smithy, house wiring, welding, casting and machining processes.
			Make a given model by using workshop trades including fitting, carpentry, tinsmithy and House wiring.
			Perform various operations in welding, machining and casting processes.
19.	20ME C03	ENGINEERING EXPLORATION	Understand the role of an engineer as a problem solver.
			Identify multi-disciplinary approaches in solving an engineering problem
			Build simple systems using engineering design process.
			Analyze engineering solutions from ethical and sustainability perspectives.
			Use basics of engineering project management skills in doing projects.
20.	20AMC01	INTRODUCTION TO ALGORITHMS AND DATA STRUCTURES	Understand the different types of data structure to be implemented using any programming language.
			Choose the data structures that effectively model the information in a problem and analyses the efficiency trade-offs (run time and memory usage) among alternative data structure implementations or combinations.
			Design, implement, test, and debug programs using a

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			variety of data structures including stacks, queues, hash tables, binary and general tree structures, search trees, and graphs.
			Apply efficient data structure (linked lists, stacks and queues) to solve a particular problem.
			Evaluate various searching and sorting algorithms.
21.	20AMC02	DISCRETE MATHEMATICAL STRUCTURES	Understand the basics of various discrete structures.
			Write short proofs, and disprove algebraic statements by finding counter examples.
			Apply discrete structures in the applications of Computer Science and Engineering.
			Represent data using trees and graphs.
			Gain skills to apply basic properties of rings and fields.
			State the characteristics of an integral domain, and the field of quotients.
22.	20AMC03	GROUP THEORY AND ITS APPLICATIONS	Understand the need of Group Theory and basic concepts related to Group Theory
			Recognize the real-world applications that use group theory
			Apply group theory for identifying symmetric and non-symmetric patterns in real-time images and structures
			Evaluate various symmetry detection algorithms
			Formulate solutions using group theory for real problems involving different patterns in the domains of Robotics, Computer Vision and Computer Graphics
23.	20AMC04	DIGITAL LOGIC DESIGN	Demonstrate the number system conversions and simplify Boolean functions.
			Recall basic theorems and properties of Boolean algebra to represent logical functions in canonical and standard forms.
			Analyze and simplify Boolean expressions using karnaugh-maps and tabulation method.
			Analyze and Design various combinational circuits and Sequential circuits used in Computer Hardware.
			Understand the designs of Combinational and Sequential circuits using Verilog HDL.
			Develop different applications by configuring registers, counters and memories.
24.	20BTO05	COGNITIVE	Gain familiarity and basic knowledge about brain



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		NEUROSCIENCE	<p>systems and functions.</p> <p>Understand brain's neuro-transmitter system.</p> <p>Understanding the brain's methods gives rise to behaviour whether we engage in any activity (e.g., walking, talking, etc.).</p> <p>Identify the patterns of varied activities in neurons that correspond to a person's attempts to move in particular ways.</p>
25.	20EGM03	UNIVERSAL HUMAN VALUESII: UNDERSTANDING HARMONY	<p>Students are expected to become more aware of themselves, and their surroundings (family, society, nature)</p> <p>They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind</p> <p>They would have better critical ability</p> <p>They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).</p> <p>It is hoped that they 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.</p>
26.	20AMC05	ALGORITHMS LAB-1	<p>Derive abstract data types for linear and non-linear data structures.</p> <p>Implement different types of data structures using any programming language.</p> <p>Choose and Implement the data structures that effectively model the information in a problem and analyses the efficiency trade-offs (run time and memory usage) among alternative data structure implementations or combinations.</p> <p>Test and debug programs using a variety of data structures including stacks, queues, hash tables, binary and general tree structures, search trees, and graphs.</p> <p>Apply efficient data structure (linked lists, stacks and queues) to solve a particular problem</p> <p>Evaluate various searching and sorting algorithms</p>
27.	20AMC06	INTRODUCTION TO INFERENCE AND	Develop awareness of causal thinking and understand selection bias.



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		INTERPRETATION	Understand counterfactual vital ideas and assumptions of causal inference methods.
			Apply causal inference methods to assess whether these assumptions are reasonable, and finally, the ways to interpret the quantity being estimated.
			Use R to work on data science related projects.
			Develop scripts for data visualization, analytics and dashboards.
28.	20AMC07	MODERN COMPUTER ARCHITECTURE	Understand the organization of the Control, arithmetic, logic unit, and memory unit and the I/O.
			Analyze different computer architectures and their applications.
			Understand distributed computing architecture and high-performance computing.
29.	20AMC08	DATABASE SYSTEMS	Understand the basics of databases and data management
			Understand various theoretical and practical principles involved in the design and use of database systems with the help of a database
			Design and implement databases for various scenarios
			Design a database scenario for handling big data
30.	20AMC09	LINEAR REGRESSION MODELING FOR DATA ANALYSIS	Obtain, clean, process, and transform data using data management techniques
			Analyze and interpret data to derive insights
			Apply computing algorithms, mathematical and statistical models, and optimization methods to solve underlying problems
31.	20MBC03	STRATEGIC ENTREPRENEURSHIP	Use innovative skills to generate ideas for new products and services.
			Evaluate the feasibility of ideas, and develop a strategy from commercialization.
			Use technology to select target markets, profile target customers, define venture's mission, and create business plans.
			Take initial steps to establish a business
			Calculate and forecast costs, breakeven, and sales
			Establish brand, setting prices, promoting products, and managing customer relationships.
32.	20EEC38	SIGNAL PROCESSING	Represents the signals and systems and Fourier series.
			Evaluate signal characteristics and systems using Fourier Transform.

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			Assess the characteristics of systems using Laplace Transform.
			Assess the characteristics the DT Signal using DTF and Z-Transform.
			Apply the Convolution and correlation for analysis of Signal.
33.	20MEC39	ROBOTICS AND AUTOMATION	Perform kinematic and dynamic analysis with simulation.
			Design control laws for a simple robot.
			Integrate mechanical and electrical hardware for a real prototype of robotic device.
			Select a robotic system for a given industrial application.
34.	20MEC40	ROBOTICS AND AUTOMATION LAB	Demonstrate the understanding of assembly and working of a robot
			Analyze the robot kinematics with the help of suitable software
			Program a robot for a specific requirement
			Apply the computer vision to the robot for a given application
			Apply AI Technologies to the robot
35.	20AMC10	DATABASE SYSTEMS LAB	Implementation of normal forms in databases.
			Implementation of basic SQL commands on a database
			Implementation of information and ranking using any language
			Implement document retrieval and ranking using any algorithm
			Implement Map-Reduce algorithm on any big data task
36.	20AMC11	BUILDING LARGE, RELIABLE SOFTWARE SYSTEMS	Apply software construction and maintenance heuristics to build code, such as ways to eliminate global variables and methods to test complex code.
			Execute software modernization techniques such as reverse engineering, reengineering, salvaging, and restructuring.
			Organize software user documentation that enhances long-term software sustainability.
			Construct software to meet clients' expectations.
			Describe the ways configuration management is used in production systems.

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