CO/PO

DEPARTMENT	PROGRAMME SPECIFIC OUTCOME
Department of Computer Science **Bachelor of Computer Applications(BCA)**	**PSO1: Identify the relevance and applications of computers in other disciplines** **PSO2:Understand the concepts of system architecture, hardware, software and network configuration** **PSO3:Acquire logical thinking and problem-solving skills to find solutions in the software domain** **PSO4: Design, analyse and develop code-based solutions for the algorithms** **PSO5: Address the industry demands and assimilate technical, logical and ethical skills needed for the industry** **PSO6: Adapt to emerging trends and tackle the challenges in the software field.**
	PROGRAMME OUTCOME
	PO1:Knowledge Acquisition: **Demonstrate a profound understanding of knowledge trends and their impact on the chosen discipline of study.** **PO2:Communication, Collaboration, Inclusiveness, and Leadership:** **Become a team player who drives positive change through effective communication, collaborative acumen, transformative leadership, and a dedication to inclusivity.** **PO3:Professional Skills:** **Demonstrate professional skills to navigate diverse career paths with confidence and adaptability.**

	PO4:Digital Intelligence: **Demonstrate proficiency in varied digital and technological tools to understand and interact with the digital world, thus effectively processing complex information.** **PO5:Scientific Awareness and Critical Thinking:** **Emerge as an innovative problem-solver and impactful mediator, applying scientific understanding and critical thinking to address challenges and advance sustainable solutions.** **PO6:Human Values, Professional Ethics, and Societal and Environmental Responsibility:** **Become a responsible leader, characterized by an unwavering commitment to human values, ethical conduct, and a fervent dedication to the well-being of society and the environment.** **PO7:Research, Innovation, and Entrepreneurship:** **Emerge as a researcher and entrepreneurial leader, forging collaborative partnerships with industry, academia, and communities to contribute enduring solutions for local, regional, and global development.**

Programme : BCA (Bachelor of Computer Applications)		
COURSE CODE & COURSE NAME	COURSE OUTCOME At the end of this BCA course the student will able to	COGNITIVE LEVEL
Cognitive level- Remember –(R),Understand –(U), Apply- (Ap),Evaluate- (E), Create- (C)Analyse(An)		
Semester 1		
BCA1CJ101 Fundamentals of Computers and Computational Thinking	CO1: Develop a foundational knowledge of computing systems, encompassing their historical development, evolutionary milestones, and the notable contributions of key figures in the field.	U
BCA1CJ101 Fundamentals of Computers and Computational Thinking	CO2: Acquire familiarity with diverse hardware components constituting a computer system.	U
	CO3: Gain practical expertise by engaging in hands-on activities focused on the installation and configuration of diverse hardware components within a computer system.	Ap
	CO4: Explore the spectrum of software types, and actively participate in the partitioning, installation, and configuration of operating systems to cultivate a comprehensive understanding of software systems.	Ap
	CO5: Develop a foundational understanding of computer science as a discipline, examining problems through the lens of computational thinking and cultivating analytical skills to address challenges in the field.	An
	CO6: Represent complex problems using algorithmic approaches and enhance problem-solving skills by visualizing solutions through the utilization of various software tools.	Ap
BCA1CJ102/BCA1MN 101 Mathematical Foundation for Computer Applications	CO1: Reflect the concept of matrices and determinants as a way to depict and streamline mathematical ideas to perform basic operations.	U
	CO2: Able to find the inverse of square matrices using different methods and demonstrate a solid understanding of eigen values.	U

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COURSE CODE & COURSE NAME	COURSE OUTCOME At the end of this BCA course the student will able to	COGNITIVE LEVEL
	CO3: Proficiency in solving linear equations using different techniques and understanding the geometric interpretation of solutions.	U
	CO4: Gain proficiency in representing vectors geometrically and algebraically, understanding vector addition, dot and cross products.	U
	CO5: Able to apply differential and integral calculus to various functions encountered in computer applications such as polynomials, exponentials and logarithmic functions.	U
	CO6: Represent various mathematical problems using algorithmic approaches and enhance problem-solving skills by visualizing solutions through the utilization of software tools.	U, Ap
BCA1CJ103/BCA1MN 102 Discrete Structures for Computer Applications	CO1: Acquire a comprehensive understanding of propositional logic and its applications, with a focus on constructing and interpreting truth tables.	U
	CO2: Able to proficiently define and manipulate sets, analyse relations and functions and their representation by Venn diagrams	U
	CO3: Acquire a basic understanding of graph theory including representations, types of graphs, their properties such as connectivity, cycles, paths and degrees.	U
	CO4: Able to demonstrate a deep understanding of advanced graph theory concepts, focusing on Euler's graph, Hamiltonian graphs, Isomorphism and Homeomorphism.	U
	CO5: Able to proficiently understand the tree data structure, spanning trees and associated algorithms for solving problems such as Prim's and Kruskal.	U
	CO6: Represent various mathematical problems using algorithmic approaches and enhance problem-solving skills by visualizing solutions through the utilization of software tools.	U, Ap

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	CO1:	
	CO2:	
	CO3:	
	CO4:	
	CO5:	
	CO6:	
	CO1:	
	CO2:	
	CO3:	
	CO4:	
	CO5:	
	CO6:	
Semester 2		
BCA2CJ101 - Fundamentals of Programming (C Language)	CO1: Remember the program structure of C with its syntax and semantics	U
	CO2: Use the various constructs of a programming language viz. conditional, iteration and recursion.	Ap
	CO3: Implement the algorithms in C language.	Ap
	CO4: Use simple data structure like array in solving problems.	Ap
	CO5: Handling pointers and memory management functions in C.	Ap
	CO6: Develop efficient programs for solving a problem.	Ap
BCA2CJ102/BCA2MN101 Statistical Foundation for Computer Applications	CO1: Apply fundamental statistics concepts	Ap
	CO2: Analyse data using descriptive statistics	

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		An
	CO3: Perform regression analysis	An
	CO4: Apply probability and statistics in real-world situations	Ap
	CO5: Develop critical thinking and problem-solving skills	E
	CO6: Communicate statistical findings effectively	E
BCA2CJ103/BCA2MN102 Numerical Analysis and Operations Research	CO1: Develop a solid foundation in numerical methods, acquiring the skills to analyse and solve algebraic and transcendental equations, and gaining a practical understanding of the sources and management of errors in numerical computations.	Ap
	CO2: Cultivate both a comprehensive grasp and practical proficiency in polynomial interpolation techniques, alongside acquiring expertise in numerical methods for the solution of definite integrals.	Ap
	CO3: Establish a robust groundwork in Operations Research, nurturing a discerning capability to critically evaluate its applications across diverse problem-solving scenarios.	Ap
	CO4: Develop expertise in Linear Programming, mastering the art of employing sophisticated optimization techniques for the effective resolution of Linear Programming problems.	Ap
	CO5: Impart a comprehensive understanding of transportation problems and cultivate an appreciation for the methods used in finding basic feasible solutions.	Ap
	CO6: Develop proficiency in addressing assignment problems and employ the method to attain optimal solutions, providing a holistic skill set for logistical	Ap

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	optimization.	
	CO1:	
	CO2:	
	CO3:	
	CO4:	
	CO5	
	CO6:	
Semester 3		
BCA3CJ201 Data Structures using C	CO1: Differentiate basic data structures (arrays, linked lists, stacks, queues) based on their characteristics, operations, and real-world applications.	U
	CO2: Perform basic operations (e.g., insertion, deletion, search) on fundamental data structures using a chosen programming language.	Ap
	CO3: Identify the properties and applications of advanced data structures (trees, graphs).	Ap
	CO4: Investigate the properties of various searching and sorting Techniques	U
	CO5: Demonstrate critical thinking and problem-solving skills by applying data structures and algorithms to address complex computational challenges.	Ap
	CO6: Implement and analyse different data structure algorithms (to solve practical problems).	Ap
BCA3CJ202 Computer Networks	CO1: To understand the fundamentals of computer networks including concepts like data communication, network topologies and the reference models	U
	CO2: Proficiency in Transmission Media and Multiplexing Techniques	A

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	CO3: To familiarise with the common networking protocols and standards	U
	CO4: Describe, analyse and compare different data link, network and transport layer protocols	A, E
	CO5: Design/implement data link and network layer protocols in simulated networking environment	Ap
	CO6: To understand the need of various Application layer protocols	U
BCA3CJ203/BCA3MN201 Introduction to Data Science	CO1: Identify the relevance and applications of computers in other disciplines with various data science applications.	R
	CO2: understanding of data science concepts and be capable of applying data science skills and interpret data science results	U
	CO3: Acquire logical thinking about evolution of data science	U
	CO4: How to use tools for acquiring, cleaning, analysing, exploring, and visualizing data	Ap
	CO5: Learn to make data-driven inferences and decisions	Ap
	CO6: Able to perform data science processing, such as data import, data analysis, data visualization, and data modelling	Ap
BCA3CJ204/BCA3MN202 - Foundations of Artificial Intelligence	CO1: Able to gain insight into the evolution of key ideas and technologies by exploring the Artificial Intelligence history and its foundational concepts.	U
	CO2: Able to acquire knowledge and skills to understand, design, implement intelligent agents to perceive, reason and act within their environments.	U

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COURSE CODE & COURSE NAME	COURSE OUTCOME At the end of this BCA course the student will able to	COGNITIVE LEVEL
	CO3: Proficiency in various uninformed and informed search strategies along with constraint satisfaction problem solving methods.	U
	CO4: Ability to design and implement logical agents and construct ontologies that capture the semantics of a domain, facilitating knowledge representation.	U
	CO5: Understand the ethical considerations of AI and their societal impacts and gain insights into the future trajectory of AI by analysing the emerging trends.	U
	CO6: Represent various AI problems using algorithmic approaches and enhance problem-solving skills by visualizing solutions through the utilization of software tools.	U, Ap
Semester 4		
BCA4CJ205 - Database Management System	CO1: A comprehensive understanding of fundamental concepts in database management systems and its application	U
	CO2: Understand concepts of Relational Data Model and Normalization Techniques	U
	CO3: Apply principles of entity-relationship modelling and normalization techniques to design efficient and well-structured databases that meet specified requirements.	Ap
	CO4: Acquire expertise in crafting and executing SQL queries for the retrieval, updating, and manipulation of data, showcasing adept skills in database querying and data manipulation	Ap
	CO5: Comprehend and apply strategies for managing transactions and implementing mechanisms for controlling concurrency, ensuring the database's consistency and reliability in environments with multiple users.	Ap
	CO6: Explore and analyze recent trends in database management systems, with a focus on unstructured databases, NoSQL technologies	An

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BCA4CJ206 **Python Programming**	CO1: Understand the basic concepts of Python programming language.	U
	CO2: Apply problem-solving skills using the basic constructs in Python programming	Ap
	CO3: Apply modular programming using functions in Python	Ap
	CO4: Analyse the various data structures and operations on it using Python	An
	CO5: Apply various packages available in Python	Ap
	CO6: Apply visualization tools in Python	Ap
BCA4CJ207 Software Engineering	CO1: To learn and understand the Concepts of Software Engineering	Ap
	CO2: To Learn and understand Software Development Life Cycle. Identify and apply appropriate SDLC models and methodologies.	Ap
	CO3: To apply the project management and analysis principles to software project development.	Ap
	CO4: To apply principles of software design to create high-quality software architectures. Demonstrate proficiency in programming languages and coding standards.	Ap
	CO5: To apply testing techniques to ensure software quality and identify and perform different types of software maintenance activities.	Ap
	CO6: Prepare and deliver effective project presentations.	Ap

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BCA4CJ208 – Automation and Robotics	CO1: Understand the production systems and automation, enabling them to analyse, optimize and evaluate the different levels of automation.	U
	CO2: Able to recognize the difference between the process industries, manufacturing industries, continuous and discrete control system.	U
	CO3: Proficiency in understanding the various forms of process control which includes the direct digital control, programmable logic control, distributable control systems etc.	U
	CO4: Familiarize with the various hardware components used for automation and process control such as sensors, actuators analog-digital converters etc.	U
	CO5: Understand the present developments in the field of automation and robotics and how integrating artificial intelligence can contribute to the future of these systems.	U
	CO6: Represent various problems using algorithmic approaches and enhance problem-solving skills by visualizing solutions through the utilization of software tools.	U, Ap
Semester 5		
BCA5CJ301 - Object Oriented Programming (Java)	CO1: To understand the concepts and features of Object-Oriented Programming (OOPs)	U
	CO2: To practice programming in Java	Ap
	CO3: To learn java's exception handling mechanism, I/O operations and multithreading.	Ap
	CO4: To learn java's O operations and multithreading.	Ap
	CO5: Implement programs using Java Database Connectivity	Ap

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	CO6: Students will be capable of developing Graphical User Interface (GUI) applications using Swing, understanding layout management, and implementing basic event handling.	Ap
BCA5CJ302 Progressive Web Application using PHP	CO1: To familiar with the concept HTML5	U
	CO2: To familiar with the concept CSS, Javascript, Server-Side Scripting	Ap
	CO3: To learn the PHP programming environment	Ap
	CO4: To learn how to develop a dynamic website using PHP and PostgreSQL	Ap
	CO5: Students will acquire knowledge of common security vulnerabilities in web applications and understand best practices for writing secure PHP code.	Ap
	CO6: Students will be equipped to develop modular and scalable PHP applications using object- oriented techniques.	Ap
BCA5CJ303 - Digital Fundamentals and Computer Organization	CO1: Understand Basic Binary Arithmetic Techniques	U
	CO2: Implement logic operations using basic gates and Boolean algebra, design and optimise logic expressions using Karnaugh maps and design combinational logic circuits	Ap
	CO3: Understand the operation of latches and flipflops and the design of sequential logic circuits	U
	CO4: Learn the basic computer organization by understanding the role of registers, buses, ALU and control unit and the concepts like parallel processing and pipelining	U

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	CO5: Understand how instructions represented, addressed and executed and how a micro programmed control unit work	U
	CO6: Understand the concepts of memory and IO organization	
Semester 6		
BCA6CJ304/BCA8MN304 Introduction to AI and ML	CO1: Differentiate various knowledge representation methods, AI operations, Machine learning approaches and real-world applications.	U
	CO2: Master Problem-Solving Techniques (search algorithms, heuristic approaches, and informed search strategies). Analyse and evaluate its efficiency.	U
	CO3: Investigate the properties and applications of various machine learning techniques	Ap
	CO4: Evaluate Artificial Intelligence Search algorithms and Machine learning approaches' efficiency.	U
	CO5: Implement and analyse Machine learning algorithms to solve practical problems.	Ap
	CO6: Apply Concepts in Real-World Projects	Ap
BCA6CJ305/BCA8MN305 - Principles of Operating System	CO1: Summarize the History, Objectives and Functions of an operating system	U
	CO2: Understand process management concepts: Process Control Block, States, Scheduling, Operations, Inter process Communication	U
	CO3: Evaluate various processor scheduling strategies, algorithms	E
	CO4: Apply process synchronisation concepts for effective process management	Ap

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	CO5: Analyse conditions for deadlock occurrence and methods of resolving.	An
	CO6: Describe various memory management techniques, including paging , segmentation and virtual memory	U
Semester 7		
BCA7CJ401 Advanced Data Structures and Algorithms	CO1: Understand the concepts of advanced data structures like tree, graphs, heaps.	U
	CO2: Understand familiarity with algorithmic techniques such as brute force, greedy, and divide and conquer.	U
	CO3: Understand Asymptotic analysis (big-O notation, time and space complexity).	U
	CO4: Application of advanced abstract data type (ADT) and data structures in solving real world problems.	Ap
	CO5: Effectively combine fundamental data structures and algorithmic techniques in building a complete algorithmic solution to a given problem	Ap
	CO6: Apply Concepts of data structures in real world problem solving	Ap
BCA7CJ402 Data Science Programming using R	CO1: Demonstrate how to install and configure RStudio	U
	CO2: Apply OOP concepts in R programming	U
	CO3: Explain the use of data structure and loop functions	U
	CO4: Understand the concept of data frames	U

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	CO5: Implement the DPLYR package and Data Visualization	Ap
	CO6: Implementation of R Programming concepts	Ap