

B.C.A. Course Outcomes Summary Sheet

Course	Title	Course Outcome 1	Course Outcome 2	Course Outcome 3	Course Outcome 4	Course Outcome 5
BCA I	Part-I Paper I Office Management Tools	Apply knowledge of computer hardware and software components to identify appropriate tools for	Utilize word processing software (MS Word) for document creation, editing, formatting, and	Create and manipulate spreadsheets (MS Excel) for data analysis, reporting, and visualization.	Design and deliver presentations (MS PowerPoint) effectively using multimedia elements and	Implement database management concepts (MS Access) for data storage, retrieval, and
BCA I	Part-I Paper II Web Application Development	Understand the fundamental principles of the internet and web technologies like HTML, CSS, and JavaScript.	Develop static web pages with proper HTML structure and basic CSS styling.	Apply Cascading Style Sheets (CSS) to enhance website appearance and layout with advanced techniques like Bootstrap.	Implement client-side scripting language (JavaScript) to add interactivity and dynamic behavior to web pages.	Understand the basics of content management systems (CMS) like Joomla or WordPress for website creation and maintenance.
BCA I	Part-I Paper III Programming in C Language	Write basic C programs using fundamental syntax, data types, operators, and control flow statements.	Design and implement functions to modularize code and improve program organization.	Understand and utilize pointers for memory management and data manipulation.	Define and work with user-defined data structures like arrays and structures.	Implement file handling operations to read and write data from external storage.
BCA I	Part-I Paper III Computer Architecture	Apply Boolean algebra and logic gates to design digital circuits for basic operations.	Understand the sequential logic concept and implement flip-flops for state retention and control.	Design and analyze arithmetic circuits (adders, subtractors) for efficient binary number manipulation.	Describe the basic organization and functionality of a central processing unit (CPU).	Explain memory hierarchy concepts and different types of memory in a computer system.
BCA I	Part-I Paper IV Operating System	Understand the role and functions of an operating system in managing computer resources.	Apply process management concepts like scheduling and synchronization to avoid deadlocks and optimize resource utilization.	Implement memory management techniques like paging and virtual memory to efficiently utilize main memory.	Design and manage file systems with appropriate data structures and allocation methods.	Understand the functionalities and basic principles of commonly used operating systems like Linux and Windows Server.
BCA I	Part-II Paper I Basic Mathematics	Master set operations, relations, and representations.	Analyze functions' domains, ranges, types, and logic applications.	Conquer matrix operations, transpose, determinants, and linear equations.	Master data analysis: frequency, central tendency, dispersion, correlation.	Understand and apply regression for relationship insights.
BCA II	Part-II Paper II Business Accounting	Master the core principles of financial accounting, including its definition, scope, objectives, limitations, and ethical considerations.	Demonstrate proficiency in applying the double-entry system to record transactions, maintain ledgers, reconcile bank statements, and prepare accurate financial reports.	Analyze depreciation methods and calculate depreciation charges for various assets while understanding provisions, reserves, and error correction procedures.	Prepare final accounts, including opening and closing entries, trading and profit & loss accounts, and balance sheets, ensuring compliance with accounting standards.	Adjust final accounts for dividends, drawings, outstanding income and expenses, depreciation, taxes, and insurance claims following best practices.
BCA II	Part-II Paper III Discrete Mathematics	Comprehend and apply various number systems, including natural numbers, integers, rational and real numbers, complex numbers, and modular arithmetic, while adhering to ethical principles in problem-solving.	Master the binomial theorem and the principle of mathematical induction to analyze and solve complex mathematical problems with accuracy and reasoning.	Operate with sets, their types, and operations, understanding relations and their properties (reflexive, symmetric, anti-symmetric, transitive, equivalence, and partial order) with inclusivity and respect for diverse approaches.	Comprehend and apply logical principles, including propositions, logical operators, proof techniques, and quantifiers, to evaluate arguments and analyze complex relationships with a focus on critical thinking and problem-solving.	Utilize Boolean algebra and logic gates to simplify functions and design circuits while promoting efficient and responsible resource utilization.
BCA II	Part-II Paper IV Operating Systems	Explain the necessity and evolution of operating systems, analyzing factors like performance, protection, security, reliability, and interoperability, highlighting the importance of sustainability and environmental considerations.	Demonstrate understanding of device management, including I/O programming concepts, device controllers, drivers, and interrupt-driven I/O, emphasizing responsible device usage and data security.	Master process management concepts like scheduling, synchronization, inter-process communication, and multi-processor synchronization, prioritizing fair and efficient resource allocation and collaboration.	Analyze memory management techniques like fixed partitions, dynamic address relocation, swapping, virtual memory, and shared memory, promoting efficient memory utilization and responsible data handling.	Understand information management with files, directories, network security, and distributed computing principles, focusing on data privacy, access control, and responsible resource sharing.
BCA II	BCA204: Data Base Management System	Apply database management principles to model, design, and implement databases for real-world applications, ensuring data integrity and reliability.	Utilize Structured Query Language (SQL) effectively for data manipulation, retrieval, and modification, optimizing queries for performance and data security.	Implement normalization techniques to optimize database structures for efficient storage, retrieval, and update operations while minimizing redundancy.	Understand and apply transaction management concepts like concurrency control and ACID properties to ensure data consistency and integrity even in concurrent access scenarios.	Analyze and compare different database models, including relational, object-oriented, and distributed databases, selecting the appropriate model based on specific application requirements.
BCA II	BCA205: Web Designing and Multimedia	Design and develop user-friendly and accessible websites using HTML, CSS, and JavaScript, adhering to design principles and web accessibility standards.	Utilize multimedia elements like images, audio, and video to enhance user experience and engagement while considering responsible resource usage and file optimization.	Implement interactive features and dynamic content using JavaScript, including forms, animations, and event handling, while promoting user privacy and secure user interactions.	Understand web search engine optimization (SEO) principles and apply relevant techniques to improve website visibility and organic search ranking.	Utilize content management systems (CMS) like WordPress or Drupal to manage website content effectively and efficiently, ensuring user-friendliness and security.
BCA II	BCA206 (A): Object Oriented Concepts (Through C++)	Utilize various inheritance types (single, multiple, and hierarchical) to promote code reuse and extend existing functionalities while understanding the implications of virtual functions and dynamic binding.	Apply exception handling mechanisms to manage unexpected errors and exceptions gracefully, ensuring program stability and robustness.	Master advanced C++ features like templates, lambda expressions, and smart pointers for efficient code development and resource management.	Understand the principles of object-oriented design (OOD) methodologies like UML and use them to design scalable and maintainable software systems.	Develop object-oriented applications in C++ that demonstrate best practices in coding, debugging, and unit testing for reliable and efficient software solutions.
BCA III	BCA III Paper I-Data Structures and Algorithms	Analyze algorithm efficiency and apply algorithms	Implement fundamental linear data structures	Design and manipulate linked lists	Construct and traverse tree structures	Represent and traverse graphs, apply algorithms
BCA III	System Design Concept	Apply system development lifecycle models	Gather and analyze user requirements	Design system components using modeling tools	Conduct comprehensive testing	Develop project plans and manage resources
BCA III	Networking Technology	Distinguish between circuit and packet switching	Describe network protocols and technologies	Explain data encoding and error handling	Understand serial data formats	Discuss transmission media
BCA III	Core Java Programming	Apply object-oriented programming concepts	Use Java language features	Develop GUIs	Implement multi-threaded applications	Establish network connectivity
BCA III	E-Commerce	Define and discuss e-commerce	Describe B2B e-commerce models	Explain electronic payment systems	Analyze e-commerce security risks	Discuss e-banking and M-Commerce
BCA III	PHP Programming	Write server-side scripts with PHP	Control program flow	Organize and manipulate data	Define and call functions, handle strings, and use regex	Process form data, manage cookies, and interact with databases

B.C.A. Program Summary Sheet

S.NO.	POs (Program Outcomes):	PSOs (Program Specific Outcomes):	PEOs (Program Educational Objectives):
PO1/PSO1/PEO1	PO1: Apply fundamental computing principles and programming skills to solve practical problems in various domains.	PSO1: Utilize office management tools for efficient productivity and communication tasks.	PEO1: Graduates will secure employment in various IT fields, including software development, web development, database administration, network administration, and e-commerce.
PO2/PSO2/PEO2	PO2: Design, develop, and maintain web applications using client-side and server-side technologies.	PSO2: Implement fundamental data structures and algorithms to optimize software performance.	PEO2: Graduates will demonstrate ethical and responsible behavior in their professional conduct and decision-making.
PO3/PSO3/PEO3	PO3: Manage and manipulate data effectively using database systems and query languages.	PSO3: Apply system design concepts to manage software projects effectively from requirements to testing.	PEO3: Graduates will adapt to evolving technologies and industry trends through continuous learning and professional development.
PO4/PSO4/PEO4	PO4: Demonstrate knowledge of computer networks and internet technologies to design and manage network infrastructure.	PSO4: Develop secure and ethical e-commerce solutions that address business needs and challenges.	PEO4: Graduates will effectively communicate technical concepts and ideas to diverse audiences, both verbally and in writing.
PO1/PSO1/PEO5	PO5: Apply object-oriented programming concepts to create modular, reusable, and maintainable software solutions.	PSO5: Create dynamic and interactive web pages using client-side scripting and server-side programming languages.	PEO5: Graduates will work collaboratively in teams to solve complex problems and achieve common goals.

Mapping of Course Outcomes of all courses of B.C.A.with Program Outcomes, Program Specific Outcomes, and Program Educational Objectives

Course Outcomes	Program Outcomes	Program Specific Outcomes	Program Educational Objectives	Level
Office Management Tools:				
CO1: Demonstrate proficiency in using common office management tools for document creation, data management, and presentations.	PO1	PSO1	PEO1, PEO5	Apply (Moderate)
CO2: Implement efficient communication strategies using email, calendar, and collaboration tools.	PO1	PSO1	PEO1, PEO2, PEO5	Understand (Moderate)
CO3: Apply digital security practices to protect data and information in office environments.	PO1	PSO1	PEO2, PEO3	Analyze (Moderate)
CO4: Design and develop professional-looking documents, presentations, and spreadsheets tailored to specific audiences.	PO1	PSO1	PEO1, PEO4	Create (Moderate)
CO5: Analyze and compare different office management tools to select the most appropriate solution for a given task.	PO1	PSO1	PEO3, PEO5	Evaluate (Moderate)
Web Application Development:				
CO1: Explain the fundamental concepts of web technologies, including HTML, CSS, and JavaScript.	PO2	PSO2, PSO5	PEO1, PEO3	Understand (Moderate)
CO2: Develop static web pages using HTML and CSS, applying best practices for accessibility and responsiveness.	PO2	PSO2, PSO5	PEO1, PEO4	Apply (Moderate)
CO3: Implement dynamic web interactions using JavaScript, including event handling and DOM manipulation.	PO2	PSO2, PSO5	PEO1, PEO3	Analyze (Moderate)
CO4: Integrate server-side technologies (e.g., PHP, Node.js) to create interactive web applications with database connectivity.	PO2	PSO2, PSO3	PEO1, PEO5	Apply (Moderate to High)
CO5: Evaluate and compare different web development frameworks and libraries to choose the most suitable option for a project.	PO2	PSO2, PSO3	PEO1, PEO3	Evaluate (Moderate)
Programming in C Language:				

CO1: Analyze and solve problems using fundamental programming concepts and algorithms.	PO1	PSO2	PEO1, PEO3	Analyze (Moderate)
CO2: Develop C programs using control structures, functions, and arrays to manipulate data effectively.	PO1, PO5	PSO2	PEO1, PEO3	Apply (Moderate)
CO3: Explain and apply pointers and structures to manage memory and organize data in C programs.	PO1, PO5	PSO2	PEO1, PEO3	Understand (Moderate)
CO4: Implement debugging techniques to identify and fix errors in C programs.	PO1, PO5	PSO2	PEO1, PEO3	Analyze (Moderate to High)
CO5: Compare and contrast different programming paradigms (e.g., procedural, object-oriented) and select the most appropriate for a specific task.	PO1, PO5	PSO2	PEO1, PEO3	Analyze (Moderate)
Computer Architecture:				
CO1: Describe the basic components and functionalities of a computer system.	PO1	PSO2	PEO1, PEO3	Understand (Moderate)
CO2: Analyze digital circuits and their operations using Boolean algebra and logic gates.	PO1	PSO2	PEO1, PEO3	Analyze (Moderate)
CO3: Explain the design and implementation principles of a central processing unit (CPU).	PO1	PSO2	PEO1, PEO3	Apply (Moderate to High)
CO4: Compare and contrast different memory organization techniques (e.g., cache, virtual memory).	PO1	PSO2	PEO1, PEO3	Analyze (Moderate)
CO5: Evaluate the performance implications of different computer architecture design choices.	PO1	PSO2	PEO1, PEO3	Evaluate (
Operating System:				
CO1: Explain the fundamental concepts and functions of operating systems.	PO1	PSO2	PEO1, PEO3	Understand (Moderate)
CO2: Analyze process management techniques, including scheduling, synchronization, and deadlock prevention.	PO1	PSO2	PEO1, PEO3	Analyze (Moderate)
CO3: Apply memory management techniques like paging, segmentation, and virtual memory to optimize resource utilization.	PO1	PSO2	PEO1, PEO3	Apply (Moderate to High)

CO4: Compare and contrast different file system structures and access methods.	PO1	PSO2	PEO1, PEO3	Analyze (Moderate)
CO5: Evaluate the performance and security implications of various operating system design choices.	PO1	PSO2	PEO1, PEO3	Evaluate (Moderate)
Basic Maths:				
CO1: Define and apply set operations (union, intersection, difference, complement) and Venn diagrams.	PO1	PSO2	PEO1, PEO3	Understand (Moderate)
CO2: Analyze and classify different types of relations (reflexive, symmetric, transitive) and functions (one-to-one, onto, bijective).	PO1	PSO2	PEO1, PEO3	Analyze (Moderate)
CO3: Apply matrix operations (addition, subtraction, multiplication, inverse) and solve systems of linear equations using various methods (e.g., Cramer's rule, Gaussian elimination).	PO1	PSO2	PEO1, PEO3	Apply (Moderate)
CO4: Calculate and interpret measures of central tendency (mean, median, mode) and dispersion (variance, standard deviation) for statistical data.	PO1	PSO2	PEO1, PEO3	Apply (Moderate)
CO5: Analyze and compare correlation coefficients (Pearson, Spearman) to assess the relationship between two variables.	PO1	PSO2	PEO1, PEO3	Analyze (Moderate)
BCAII Business Accounti				
CO1: Define and explain the fundamental concepts of financial accounting, including its scope, objectives, users, and limitations.	-	PSO1 (Supports)	PEO1, PEO3, PEO4	Understand (Moderate)
CO2: Apply the principles, concepts, and conventions of financial accounting to record and classify business transactions.	PO1, PO5	PSO1 (Applies)	PEO1, PEO3, PEO4	Apply (Moderate)
CO3: Analyze and interpret various accounting records, including journals, ledgers, and trial balances.	PO1	PSO1 (Applies)	PEO1, PEO3, PEO4	Analyze (Moderate)

CO4: Prepare and interpret basic financial statements like the Trading Account, Profit and Loss Account, and Balance Sheet.	PO1, PO5	PSO1 (Applies)	PEO1, PEO3, PEO4	Apply (Moderate)
CO5: Analyze and adjust final accounts for outstanding income and expenses, depreciation, and tax liabilities.	PO1	PSO1 (Applies)	PEO1, PEO3, PEO4	Analyze (Moderate)
Discrete Mathematics				
CO1: Explain and apply various number representation systems (decimal, binary) and perform conversions between them.	PO1	PSO2 (Applies)	PEO1, PEO3, PEO4	Understand (Moderate)
CO2: Apply the Binomial Theorem and Principle of Mathematical Induction to solve problems.	PO1	PSO2 (Applies)	PEO1, PEO3, PEO4	Apply (Moderate)
CO3: Analyze and solve recurrence relations using generating functions.	PO1	PSO2 (Applies)	PEO1, PEO3, PEO4	Analyze (Moderate to High)
CO4: Define and perform operations on sets, including Venn diagrams and De Morgan's laws.	PO1	PSO2 (Applies)	PEO1, PEO3, PEO4	Understand (Moderate)
CO5: Analyze and classify different types of relations and functions.	PO1	PSO2 (Applies)	PEO1, PEO3, PEO4	Analyze (Moderate)
Operating System:				
CO1: Explain the fundamental functionalities and design principles of operating systems.	PO1	PSO2, PSO3 (Supports)	PEO1, PEO3, PEO4	Understand (Moderate)
CO2: Analyze process management techniques like scheduling, synchronization, and deadlock prevention.	PO1	PSO2, PSO3 (Applies)	PEO1, PEO3, PEO4	Analyze (Moderate)
CO3: Apply memory management techniques (paging, segmentation, virtual memory) to optimize resource utilization.	PO1	PSO2, PSO3 (Applies)	PEO1, PEO3, PEO4	Apply (Moderate to High)
Database Management System:				
CO1: Define and Explain the fundamental concepts of database systems, including architecture, schemas, instances, and data independence.	PO1	PSO3 (Supports)	PEO1, PEO3, PEO4	Understand (Moderate)
CO2: Apply the Entity-Relationship model to design and represent database systems.	PO1	PSO3 (Applies)	PEO1, PEO3, PEO4	Apply (Moderate)

CO3: Analyze and understand relational algebra operations and their implementation.	PO1, PO3	PSO3 (Applies)	PEO1, PEO3, PEO4	Analyze (Moderate)
CO4: Apply normalization techniques to ensure data integrity and minimize redundancy in databases.	PO1, PO3	PSO3 (Applies)	PEO1, PEO3, PEO4	Apply (Moderate to High)
CO5: Understand and explain transaction management concepts like atomicity, consistency, isolation, and durability (ACID).	PO1	PSO3 (Applies)	PEO1, PEO3, PEO4	Understand (Moderate)
Object Oriented Concepts (Through C++)				
CO1. Identify, define, and explain fundamental object-oriented programming concepts like classes, objects, inheritance, polymorphism, and encapsulation.	PO1, PO5	PSO2, PSO5 (Supports)	PEO1, PEO3, PEO4	Understand (Moderate)
CO2: Apply object-oriented principles to design, develop, and implement modular and reusable software solutions.	PO1, PO5	PSO2, PSO3, PSO5 (Applies)	PEO1, PEO3, PEO4	Apply (Moderate to High)
CO3: Utilize data structures (arrays, linked lists, trees) and algorithms (searching, sorting) effectively within object-oriented programs.	PO1, PO5	PSO2, PSO3, PSO5 (Applies)	PEO1, PEO3, PEO4	Apply (Moderate to High)
CO4: Understand and apply advanced object-oriented concepts like exception handling, operator overloading, and templates.	PO1, PO5	PSO2, PSO3, PSO5 (Applies)	PEO1, PEO3, PEO4	Analyze (Moderate to High)
BCA III Data Structures and Algorithms				
Analyze algorithm efficiency and apply algorithms	PO1, PO5	PSO1	PEO1, PEO2, PEO3, PEO5	Analyze (Moderate)
Implement fundamental linear data structures	PO1, PO5	PSO1	PEO1, PEO2, PEO3, PEO5	Apply (Moderate)
Design and manipulate linked lists	PO1, PO5	PSO1	PEO1, PEO2, PEO3, PEO5	Create (Moderate)
Construct and traverse tree structures	PO1, PO5	PSO1	PEO1, PEO2, PEO3, PEO5	Create (Moderate)
Represent and traverse graphs, apply algorithms	PO1, PO5	PSO1	PEO1, PEO2, PEO3, PEO5	Analyze (Moderate)
System Design Concepts				
Apply system development lifecycle models	PO1, PO2, PO5	PSO1	PEO1, PEO2, PEO3, PEO5	Apply (Moderate)
Gather and analyze user requirements	PO1, PO2, PO5	PSO1	PEO1, PEO2, PEO3, PEO5	Analyze (Moderate)
Design system components using modeling tools	PO1, PO2, PO5	PSO1	PEO1, PEO2, PEO3, PEO5	Create (Moderate)
Conduct comprehensive testing	PO1, PO2, PO5	PSO1	PEO1, PEO2, PEO3, PEO5	Analyze (Moderate)
Develop project plans and manage resources	PO1, PO2, PO5	PSO1	PEO1, PEO2, PEO3, PEO5	Apply (Moderate)

Networking Technologies				
Distinguish between circuit and packet switching	PO1, PO3	PSO4	PEO1, PEO2, PEO3, PEO5	Understand (Moderate)
Describe network protocols and technologies	PO1, PO3	PSO4	PEO1, PEO2, PEO3, PEO5	Understand (Moderate)
Explain data encoding and error handling	PO1, PO3	PSO4	PEO1, PEO2, PEO3, PEO5	Understand (Moderate)
Understand serial data formats	PO1, PO3	PSO4	PEO1, PEO2, PEO3, PEO5	Understand (Moderate)
Discuss transmission media	PO1, PO3	PSO4	PEO1, PEO2, PEO3, PEO5	Understand (Moderate)
Core Java Programming				
Apply object-oriented programming concepts	PO1, PO5	PSO2	PEO1, PEO2, PEO3, PEO5	Apply (Moderate)
Use Java language features	PO1, PO5	PSO2	PEO1, PEO2, PEO3, PEO5	Apply (Moderate)
Develop GUIs	PO1, PO2, PO5	PSO2	PEO1, PEO2, PEO3, PEO5	Create (Moderate)
Implement multi-threaded applications	PO1, PO3, PO5	PSO2	PEO1, PEO2, PEO3, PEO5	Apply (Moderate)
Establish network connectivity	PO1, PO3, PO5	PSO2	PEO1, PEO2, PEO3, PEO5	Apply (Moderate)
E-Commerce				
Define and discuss e-commerce	PO1, PO2, PO5	PSO3	PEO1, PEO2, PEO3, PEO5	Understand (Moderate)
Describe B2B e-commerce models	PO1, PO2, PO5	PSO3	PEO1, PEO2, PEO3, PEO5	Understand (Moderate)
Explain electronic payment systems	PO1, PO2, PO5	PSO3	PEO1, PEO2, PEO3, PEO5	Understand (Moderate)
Analyze e-commerce security risks	PO1, PO2, PO5	PSO3	PEO1, PEO2, PEO3, PEO5	Analyze (Moderate)
Discuss e-banking and M-Commerce	PO1, PO2, PO5	PSO3	PEO1, PEO2, PEO3, PEO5	Understand (Moderate)
PHP Programming				
Write server-side scripts with PHP	PO1, PO5	PSO3	PEO1, PEO2, PEO3, PEO5	Apply (Moderate)
Control program flow	PO1, PO5	PSO3	PEO1, PEO2, PEO3, PEO5	Apply (Moderate)
Organize and manipulate data	PO1, PO5	PSO3	PEO1, PEO2, PEO3, PEO5	Apply (Moderate)
Define and call functions, handle strings, and use regex	PO1, PO5	PSO3	PEO1, PEO2, PEO3, PEO5	Apply (Moderate)
Process form data, manage cookies, and interact with databases	PO1, PO5	PSO3	PEO1, PEO2, PEO3, PEO5	Apply (Moderate)