Master of Computer Application (MCA) 2022-23
Programme Outcomes and Course Outcomes

Programme outcome (POs)

PO1	Computational knowledge	Acquire knowledge of Computing Fundamentals, Basic Mathematics, Computing Specialization and Domain Knowledge of proper computing models from defined problems.
PO2	Problem analysis	Identify, formulate and analyze complex engineering problems reading substantiated conclusions using first principles mathematics, computer science and relevant domains.
PO3	Design/development of solutions	Ability to design efficient solution for complex, real-life problem, system software or process as per needs and specifications.
PO4	Conduct investigations of complex computing problems	Use research-based knowledge and research methods including design of experiments, analysis & interpretation of data & synthesis of information to provide valid conclusions.
PO5	Modern Tool Usage	Ability to demonstrate skills to use modern technologies and tools to analyse problems.
PO6	Professional Ethics	Ability to perform professional practices in an ethical way, keeping in the mind cyber regulations & laws, responsibilities and norms of professional computing practices.
PO7	Life-Long Learning	Ability to develop confidence for self-education and life-long learning in the broadest context of technological change
PO8	Project management and finance	Ability to demonstrate knowledge & understanding of the engineering and management principles and apply them as a member & as a leader in a team to manage multidisciplinary projects.
PO9	Communication Efficacy	Ability to effectively communicate with the technical community and with the society about complex computing activities in both verbal and written form, design documentation, make effective presentations.
PO10	Societal and Environmental Concern	Ability to understand the impact of IT solutions in a global and societal context.
PO11	Individual and Team Work	Ability to work multi-disciplinary team both as a member and leader, as per need.
PO12	Innovations and entrepreneurship	Ability to apply innovation to a suitable opportunity to create value and wealth for the betterment of the individual and society at large.

Program Specific Outcome (PSOs)

PSO 1	To prepare students who will create systems through software development to solve problems in Industry domain areas.
PSO2	To Prepare students who will contribute to societal growth through research in their chosen field.
PSO3	To prepare students who will perform both as an individual and in a team through good analytical, design and implementation skills.
PSO4	To prepare students who will be lifelong learners through continuous professional development.

Course Outcomes (COs)

Course Code	Course Name	Course Outcome
MCA101	Problem Solving using 'C' Language	CO1. Able to understand the basic concepts of C programming language & improve the understanding, remembering of using data types, variables and arithmetic operations in C programming. CO2. Able to understand Array String, Functions concepts and implement array and string using functions. CO3. Able to understand the concept of pointer & preprocessor directives. In addition, resolve real world problems and able to design and develop various programming problems using C programming concepts. CO4. Able to Implement advance C programming concepts like structure and union & dynamic memory allocation by using malloc and calloc function etc. CO5. Able to analyze, understand the file handling using C Programming language. CO6. Create & design file handling using C Programming language.
MCA102	Web Programming	CO1. Knowledge of Internet, and the principles of web design. CO2. Understand and interpret the language of the web HTML: Basic tags and program and media tags to make program effective. CO3. Discover web pages by applying the HTML and CSS features with different layouts as per need of applications. CO4. Analyse and illustrate the types of style sheet which is suitable to use in particular case by relate the inline, internal and external type of CSS. CO5. Evaluate and design the websites with professional look and feel using both HTML and CSS. CO6. Create and design the dynamic web pages by using the JavaScript concepts.

MCA103	Discrete Mathematics	CO1.	Solve an argument using logical notation like prepositional logic and determine if the argument is or is not valid. Learn about permutation and combination and also Pigeonhole Principle.
		CO2.	Illustrate the basic principle of mathematical induction and also understand the algebraic structure related to the groups, and elementary properties of Rings and Fields.
		CO3.	Evaluate the problem using recurrence relations and Homogenous and Non homogenous equation, Line in a plane in general position and tower of Hanoi problem.
		CO4.	Design and learn about basic concepts of graph, connectivity, subgraphs, isomorphism, trees, complete graphs, bipartite graphs, matching colourability, planarity, digraphs.
		CO5.	To understand algorithm Fundamental theorem of Arithmetic, Congruence relation, Congruence Equations.
		CO6.	To understand the overview of Formal Languages: Representation of regular languages and grammars, finite state Machines
MCA104	Operating System	CO1.	Explain the types of operating system and ability to create threads and perform interposes communication.
		CO2.	Understand process management, resource management, memory management, Disk management problems.
		CO3.	Apply issues surrounding process management, resource management, memory management, Disk management problems.
		CO4.	Analyse issue pertaining to process management, resource management, memory management, Disk management problems
		CO5.	Be able to evaluate to process management, resource management, memory management, Disk management problems.
		CO6.	To create design and develop algorithms related to process management, resource management, memory management, Disk management problems
MCA105	Cyber Security	CO1.	Define a deeper understanding and familiarity with various types of cyberattacks, cybercrimes, vulnerabilities and remedies thereto.
		CO2.	Understand and evaluate existing legal framework and laws on Cyber Security.
		CO3.	Illustrate the security aspects of social media platform and ethical aspects associated with use of social media.
		CO4.	Analyse and evaluate the digital payment system security and remedial measures against digital payment frauds.
		CO5.	Analyse and evaluate the cyber security risks.

		CO6.	Create National Cyber Security policy and strategies and types of Security controls and their goals.
MCA106	Professional Communications	CO1.	Associating knowledge, skills, and judgment with human communication that facilitate their ability to work.
		CO2.	Categorizing the sub-skills of listening and speaking and be able to deliver effectively in the real time contexts.
		CO3.	Imbibing the mechanics of writing professional testimonies and will help the students to construct effective paragraphs which befit in a longer composition.
		CO4.	Expressing the different forms of written communication techniques to make effective internal and external business correspondence.
		CO5.	Displaying etiquette to work collaboratively with others considering various hindrances that occur and how to abolish them by being articulate and professional.
		CO6.	Apply the knowledge of communication to enhance employability skills
MCAP11	C Programming Lab	CO1.	Simple programs to understand & create the concepts of data types, operations and expressions.
		CO2.	By analyze and applying conditional and control statements.
		CO3.	Implementing Concept of array and String to solve problem.
		CO4.	Analyze and Implementation of functions, pointers, operation on pointers and dynamic storage allocation.
		CO5.	Defining, applying and handling structures, array of structures, union and processing data
		CO6.	Create & design file handling using C Programming language.
MCAP12	Web Programming Lab	CO1.	Illustrate the HTML programs and thereby website.
		CO2.	Interpret the programming solutions using CSS programming concepts.
		CO3.	Articulate the concepts like changing look-n-feel of the multiple web pages from single source using CSS.
		CO4.	Analyse and relate which type of style sheet is suitable to use in particular case by the inline, internal and external type of CSS.
		CO5.	Evaluate and reframe the websites with professional look and feel.
		CO6.	Create and design the dynamic web pages using java script.
MCAP14	Linux Lab	CO1.	Able to acquire knowledge and remember basic commands of LINUX and shell programming constructs

		CO2. Able to understand basic commands of LINUX and shell programming constructs. CO3. To apply basic commands of LINUX and shell programming constructs. CO4. To analyse difference between basic commands of LINUX and shell programming constructs CO5. Able to evaluate expressions using basic commands of LINUX and shell programming constructs. CO6. Able to create applications/software using shell programming constructs
MCAP16	Communication Seminar	CO1. Associating knowledge, skills, and judgment with human communication that facilitate their ability to work. CO2. Categorizing the sub-skills of listening and speaking and be able to deliver effectively in the real time contexts. CO3. Imbibing the mechanics of writing professional testimonies and will help the students to construct effective paragraphs which befit in a longer composition. CO4. Expressing the different forms of written communication techniques to make effective internal and external business correspondence. CO5. Displaying etiquette to work collaboratively with others considering various hindrances that occur and how to abolish them by being articulate and professional.
MCA201	Data Structure using 'C'	CO1. Able to understand and remember basics of C programming language and arrays & able to apply basic concepts of linked list & its types CO2. Able to understand and apply basic concepts of stack and queues through array and linked list CO3. To understand and apply the basic knowledge of Binary trees & its representation, traversing in BST, Threaded binary tree, Huffman algorithm etc. CO4. Able to understand the concepts of sorting. CO5. To understand &apply searching & Hashing techniques CO6. Create the structure of different types of graphs
MCA202	Java Programming	CO1. Understanding the syntax and semantics of java programming language, basic concepts of OOP implementation and use of a variety of basic control structures including selection and repetition, classes and objects. CO2. Knowledge about primitive and reference data types including composition; basic AWT components; file-based I/O; and arrays. CO3. Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.

		CO4. Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes CO5. Design event driven GUI and web related applications like Applets which mimic the real word scenarios. CO6. Plan Files handling program
MCA203	DBMS	CO1. Describe the various database components, models, DBMS architecture and Database Security, transactions processing and concurrency control. CO2. Understanding the basic concepts of DBMS, relational model, languages used to define relation, database designing, transactions and methods to controlling its execution. CO3. Apply normalization and functional dependency on database. CO4. Analyse the transaction processing and serializability for transaction processing. CO5. Evaluate the concurrency control techniques and recovery in databases. CO6. Design the database.
MCA204	Software Engineering	CO1. Define software engineering, process and software process models. CO2. Explain, interpret minimum requirements, types of requirements for the development of application. CO3. Construct, develop, build (COCOMO, Putnam's, function point), Introduction to project scheduling, project schedules, project and activities, scheduling activities, Schedule development methods (Critical Path Method, Critical Chain Scheduling, PERT). CO4. Examine, classify, and compare efficient reliable software solutions by creating a blue print for further development. CO5. Assess SW engineering testing and risk strategies, and develops their appropriate applications. CO6. Design, discuss, choose various software engineering tools
MCA205	Artificial Intelligence	CO1. Describe fundamental understanding of the history of AI CO2. Apply basic principles of AI in solutions that require problem solving, inference, perception CO3. Demonstrate awareness and a fundamental understanding of various applications of AI CO4. Apply different search algorithms CO5. Understand Natural Language Processing CO6. Plan heuristic algorithm
MCA206	Statistics	CO1. To gain knowledge of statistical method like Average, Correlation, Regression, dispersion probability and probability distribution

		CO2. To understand statistical method like Average, Correlation, Regression, dispersion probability and probability distribution CO3. To apply statistical method and probability distribution CO4. To analyze various statistical method and probability distribution CO5. To apply statistical method probability distribution and statistical test to test the hypothesis CO6. To create new statistical method probability distribution and statistical test
MCAP21	Data Structure Lab	CO1. Analyze & understand the difference between linear and non linear DS & implement array & link list and its types CO2. Understand and implement stack and queues using array and link list CO3. Understand and implement BST, addition and deletion of nodes, Huffman algorithm etc. CO4. To implement different sorting techniques like selection Bubble, insertion, merge quick sort etc. CO5. To understand and implement linear and binary search CO6. To create and implement of graphs like directed and undirected graphs etc
MCAP22	Java Programming Lab	CO1. Use an integrated development environment to write, compile, run, and test simple object-oriented Java programs. CO2. Validate input in a Java program. CO3. Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages. CO4. Create Multithreading programs and Exception handling to develop efficient and error free codes. CO5. Design event driven GUI and web related applications which mimic the real world scenarios using AWT. CO6. Plan Java files programs.
MCAP23	SQL Lab	CO1. Defining the databases, tables and query a database using SQL DML/DDL commands. CO2. Understanding the sub languages used in SQL to work with database CO3. Demonstrate the use of constraints, relational algebra operations and Grouping. CO4. Analyse the knowledge of SQL queries in while developing database applications. CO5. Evaluate the concept of Views, Rollback, Commit, Grant and Revoke Permission. CO6. Design solutions for real world problems/case studies by creating efficient database schema.
MCASM24	Seminar and Presentation	CO1. Defining the aim of the seminar topic.

		CO2. Understanding the seminar topic and requirements of technical resources. CO3. Apply the critical thinking on the topic of the seminar CO4. Illustrate the work done in the topic with presentation. CO5. Work is evaluated by a panel to boost the confidence to the student. CO6. Create technical documents.
MCA301.1	Advance Java	CO1. Understand different layout managers and event handling CO2. Understand different types of java beans CO3. Design java JDBC with different databases CO4. Understand java servlets CO5. Design JSP web applications CO6. Plan java servlet programs
MCA301.2	Python	CO1. Knowledge and remember the programming constructs used in python. CO2. Understanding the facts behind the sequences, functions, modules, files, database and object oriented etc. used in Python CO3. Apply data structure primitives like strings, lists, tuples, sets and dictionaries on various types of data with or without using functions, object-oriented concepts to the programs in Python etc. CO4. Distinguish and analyze basic constructs of Python and how constructs can be used all together. CO5. Evaluate the programming constructs of Python to provide verdict on findings. CO6. Create python programs using various programming constructs of Python.
MCA301.3	PL/ SQL	CO1. Knowledge and remembering the SQL and programming constructs used in PL/SQL. CO2. Understanding the PL/SQL structure, basic programming attributes, cursors, error handling, procedure & functions, packages, and triggers. CO3. Apply data structure primitives like cursors, triggers etc. on various types of data with or without using functions or procedures. Handling the errors to make the program robust. CO4. Analyse the effect of applying cursors, triggers, and other primitives. CO5. Evaluate the effect on the data base after applying SQL query and PL/SQL constructs. CO6. Create PL/SQL programs using various programming constructs of Python.
MCA302.1	PHP Programming	CO1. Understand the basic concepts of PHP and write PHP programs. CO2. Design and develop interactive websites.

		CO3. Implement concepts like session handling, database operations etc. CO4. Develop professional websites using various PHP tools such as PHP Super Global, Exception handling and other PHP programming constructs. CO5. Serve the society by creating and evaluating the websites with professional look and feel and use these skills to build successful career. CO6. Create the connection between PHP with MySql Database
MCA302.2	C# Dot Net	CO1. Knowledge and remember.NET Framework, its runtime environment and application development IDE of Visual Studio. CO2. Understand the concept of object oriented for making programs. CO3. Implement C# language constructs in the form of stand-alone console and window form applications. CO4. Analyse and Understand database concepts in ADO.NET and apply the knowledge to implement distributed data-driven applications. CO5. Design, document, debug ASP.NET web forms with server and validation controls and implement ASP.NET web services. Create the programs based on console, windows and web application.
MCA303	Algorithm Analysis & Design	CO1. Remember the basic concepts and complexities for various algorithms. Demonstrate P and NP complexity classes of the Problem. CO2. Understand the concepts of asymptotic notations to Explain the complexities of various algorithms. CO3. Apply and solve various sorting and tree-based algorithms. CO4. Finding efficient solutions using various algorithms for given problems. CO5. Evaluate and checking innovative solutions for real-world problems using different paradigms. CO6. Construct the solution for real-world problems using various problem solving techniques
MCA304	Network Security & Cryptography	CO1. Able to understand & remember basics of cryptography &security like active and passive attacks and encryption and decryption techniques CO2. Able to understand and apply the concept of linear and differential crypt analysis CO3. Able to understand & remember basics of conventional encryption techniques like DES, Blowfish etc.

		CO4. Able to understand basics of message authentication like digital signature, SET Authentication protocol like Kerberos etc. CO5. Able to understand & remember the concept of SSL. CO6. To design and compose Email security, Authentication Header, & Encapsulating Payload etc.
MCA305	Computer Networks	CO1. Outline the basic concept of networking, types, networking topologies and layered architecture. Master the data communications terminology. CO2. Explain data link layer and MAC sub-layer. CO3. Illustrate and identify the underlying concepts of IPv4 & IPv6 protocols, Routing Algorithms, IP Addressing and Working of Networking Devices. CO4. Discover the intricacies in the design of transport layer. CO5. Relate application layer functionalities protocols along with concepts of security in networks. CO6. Design and implement layer protocols within an environment.
MCA306	Research Methodology	CO1. Defining of the basic framework of research process CO2. Describing of various research designs and techniques. CO3. Illustrate the various sources of information for literature review and data collection. CO4. Analyse the ethical dimensions of conducting applied research CO5. Evaluate the components of scholarly writing and its quality CO6. Design a well-structured research paper and scientific presentations
MCAP31.1	Advance Java Lab	CO1. Understand different layout managers and event handling CO2. Understand different types of java beans CO3. Design java JDBC with different databases CO4. Understand java servlets and web applications CO5. Design JSP web applications CO6. Plan Java Servelets
MCAP31.2	Python Lab	CO1. Describe the program creation in Python through usage of appropriate constructs CO2. Demonstrate the working of basic programming constructors in Python. CO3. Apply data structure primitives like strings, lists, tuples, sets and dictionaries on various types of data with or without using functions, object-oriented concepts to the programs in Python etc. CO4. Analyze basic constructs of Python and how constructs can be used all together. CO5. Evaluate the programs and its logic.

		CO6. Develop programs using methods of constructs define in Python.
MCAP31.3	PL/ SQL Lab	CO1. Knowledge of Creating Databases, tables and query a database using SQL DML/DDL commands. CO2. Understand the programming constructs of PL/SQL. CO3. Apply data structure primitives like cursors, triggers etc. on various types of data with or without using functions or procedures. Handling the errors to make the program robust. CO4. Analyze the effect of applying cursors, triggers, and other primitives. CO5. Evaluate the effect on the data base after applying SQL query and PL/SQL constructs. CO6. Create PL/SQL programs using various programming constructs of Python.
MCAP32.1	PHP Programming Lab	CO1. Understand the basic concepts of PHP and write PHP programs. CO2. Design and develop interactive websites. CO3. Implement concepts like session handling, database operations etc. CO4. Develop professional websites using various PHP tools such as PHP Super Globals, Exception handling and other PHP programming constructs. CO5. Serve the society by creating and evaluating the websites with professional look and feel and use these skills to build successful career. CO6. Create the connection between PHP with MySql Database
MCAP32.2	C# Dot Net Lab	CO1. Remember the basics of C# programming, different graphics tools and their use. CO2. Understand of static and dynamic web pages using standard tools and learn various properties of the tools. CO3. Develop interactive and user friendly websites using front end and back end programming. CO4. To develop, implement and creating Applications with ADO.NET and SQL server CO5. Create user interactive web pages using ASP.Net and xml. CO6. Create console, windows and wed applications
MCARBP	Project / Research Based Project	CO1. Identify the problem and describing it. CO2. Understand the requirements of the chosen project. CO3. Apply the collected requirements to define the describe the project in a systematic and comprehensive approach. CO4. Analyze the technical aspects of the chosen project to find the possible solutions for development of the project.

		CO5. Evaluate the effective reports and documentation for all project related activities and solutions. CO6. Create plan for the project development.
MCA401.1	Android Programming	CO1. Knowledge and remember the basics of Java and Android CO2. Describe the life cycles of Activities, Applications etc. CO3. Apply the major components of Android API set to make apps. Use the development tools in the Android development environment. CO4. Classifying and finding uses of UI –components and java Constructs. CO5. Make UI-rich apps using all the major UI components. CO6. Create Android apps using Java programming language.
MCA401.2	Data Science in Python	CO1. Defining the fundamental of data science and libraries used. CO2. Understanding the scientific computing in Python, data analysis and plotting. CO3. Applying data science functions on data CO4. Analysing data through plots. CO5. Evaluate the output produced by the different data science constructs. CO6. Designing programs based on data science concepts.
MCA402.1	Mobile Computing	CO1. Defining the concept of mobile computing, architecture, multiple access protocols CO2. Explain the concept of wireless LAN, Bluetooth, mobile IP CO3. Utilize data management and data replication for mobiles computers CO4. Compare the transaction processing models in mobile computer CO5. Appraise the concept of ad-hoc network in wireless CO6. Discuss and elaborate Various adhoc routing algorithms
MCA402.2	Blockchain Technology	CO1. Identify and define the basic concepts of blockchain technology. CO2. Describe the basic concepts, technology used for blockchain and primitives of the distributed computing and cryptography related to blockchain. CO3. Illustrate the security features in blockchain technologies and ways of achieving it. CO4. Analyze the use of decentralization, consensus mechanism, smart contract etc. used in block chain technology. CO5. Evaluate some technologies based upon block chain. CO6. Discuss case studies based on the blockchain technology.
MCA402.3	Cloud Computing	CO1. Defining the basic concepts, principles and paradigm of Cloud Computing

		CO2. Understanding of various Cloud computing models and services. CO3. Analyzing the significance of implementing virtualization techniques. CO4. Evaluate the need of security in Cloud computing. CO5. Interpret the concept SOA and cloud-based storage in Cloud computing. CO6. Create different cloud databases in Cloud Computing.
MCA403	Research & Publication Ethics	CO1. Defining research ethics, publications misconduct and plagiarism. CO2. Describing research ethics, publications misconduct and plagiarism. CO3. Illustrate the intellectual honesty and research integrity. CO4. Illustrate the various sources of information for data bases and research matrices. CO5. Compare and understand the Open access publications and initiatives. CO6. Appreciate the components of scholarly writing and evaluate its quality
MCAP41.1	Android Programming Lab	CO1. Remember the basics of Java programming, different graphics tools and their use. CO2. Development of static and dynamic web APPs using standard tools and learn various properties of the tools. CO3. Develop interactive and user-friendly APPs using front end and back-end programming. CO4. Develop simple applications using tools available in android studio. CO5. Implement interactive graphics applications that use graphics tools, using android studio. CO6. Create Android apps using Java programming language.
MCAP41.2	Data Science in Python Lab	CO1. Design algorithms involving more complex data structures, and can implement it. CO2. Understanding the performance of multiple methods and models, recognize the connections between how the data were collected and the scope of conclusions from the resulting analysis CO3. Apply models and use different measures of model to assess outputs. CO4. Analyse the data model applied using the data science tools. CO5. Evaluate the data from disparate sources, cleaning the data and transform data from one format to another CO6. Developing the program using various tools of data science.
MCASM42	Seminar and Presentation	CO1. Defining the aim of the seminar topic.

		CO2. Understanding the seminar topic and requirements of technical resources. CO3. Apply the critical thinking on the topic of the seminar CO4. Illustrate the work done in the topic with presentation. CO5. Work is evaluated by a panel to boost the confidence to the student. CO7. Create technical documents.
MCARP	Research Project	CO1. Identify the problem and describing it. CO2. Understand the requirements of the chosen project. CO3. Apply the collected requirements to define the describe the project in a systematic and comprehensive approach. CO4. Analyze the technical aspects of the chosen project to find the possible solutions for development of the project. CO5. Evaluate the effective reports and documentation for all project related activities and solutions. CO6. Create plan for the project development.
BRD101	Fundamental of Computers & Programming	CO1. Compare and contrast various types of computers and hardware's CO2. Explain the purpose of CPU and how it works CO3. Describe how information is stored in memory CO4. Understanding different types of operating system and commands used in it. CO5. Know about various types of software's and its applications CO6. Create and design various algorithms and flowchart
BRD102	Office Automation	CO1. Define word document and using it to create reports. CO2. Demonstrate how excel is used for creating tables, writing formulas and generating charts. CO3. Make use of Power Point for presentation CO4. Analyze MS-Access and how to use it to create database. CO5. Compare MS-Word, MS-Excel. CO6. Discuss how MS-PowerPoint and MS-Access work together.

Bachelor of Computer Application (BCA) Ist Year 2022-23
Programme outcomes and Course Outcomes

Programme outcome (POs)

PO1	Computational knowledge	Ability to demonstrate knowledge of Computer science and its applications in order to enhancebasic understanding of various software technologies.
PO2	Problem analysis	Ability to analyze and identify various business and technical problems to further solve problemswith effective communication.
PO3	Design/development of solutions	Ability to adapt analytical, logical and managerial skills with the technical aspects in order to design and deploy reliable software programs and application for real world problems
PO4	Conduct investigations of complex computing problems	Ability to investigate complex problems and provide computer-based solutions.
PO5	Professional Ethics	Ability to understand and deliver ethical, social and cultural responsibilities in professional environment as an individual and team.
PO6	Modern Tool Usage	Ability to adapt new technologies for upgrading their skills and contributing to a lifelonglearning.
PO7	Project management	Ability to create and manage multidisciplinary projects and successfully apply software and project management principles.
PO8	Innovations and entrepreneurship	Ability to become employable in a variety of IT companies and government sector and also seek entrepreneurship opportunities for the betterment of an individual and society at large.
PO9	Database technology	An ability to design and implement database solutions using available technologies.
PO10	Life-Long Learning	Acquired skills and to recognize the need for life-long learning for continuing professional development.

PO11	Communication Efficacy	Excellent verbal communication skills with capability to work in multidisciplinary teams with positive attitude
PO12	Individual and Team Work	An ability to work effectively as an individual as well as a member of a team and provide technical and visionary leadership to others.

Course Outcomes (COs)

Course Code	Course Name	Course Outcome
BCA101	Programming in 'C'	CO1. Identify the basic concepts of C programming language & improve the understanding, remembering of using data types, variables and arithmetic operations in C programming. CO2. Understanding Array String, Functions concepts and implement array and string using functions. CO3. Apply the concept of pointer & preprocessor directives. In addition, resolve real world problems Able to design and develop various programming problems using C programming concepts. CO4. Analyze the concepts of structure and union & dynamic memory allocation by using malloc and calloc function etc. CO5. Evaluate file handling using C Programming language. CO6. Plan a project using C programming language.
BCA102	Computer Fundamental & Information Technology	CO1. Describe the knowledge of basic components of computer systems and its functionality. CO2. Understand the classification of various types of memory in computer and concept of input and output devices and. CO3. Solve the number systems by applying various types of conversion techniques and their representations. CO4. Illustrate an operating system by analyzing its working learn basic word processing, spreadsheet and presentation graphics and learn about various viruses and prevention from them. CO5. Evaluate various problem solving techniques like algorithm, flowchart etc. and Learn generation of languages, basic concepts of OOPs, SQL etc. CO7. Design and Develop computer network and various communication modes, communication media like LAN, MAN, WAN etc.
BCAME103A	Digital Electronics	CO1. Identify and represent numeric information in different forms.

		CO2. Understand machine level representation of data and perform operations on it. CO3. Apply K-Maps and Tabulation methods for Simplification of Boolean expressions and construct logic circuit. CO4. Analyse logic circuits and deduce logic expressions and truth tables. CO5. Evaluate digital number systems and use Boolean algebra theorems, Properties and Canonical form for digital logic circuit design. CO6. Design and analyse small combinational & sequential circuits to build larger more complex circuits.
BCAME103B	Computer Based Numerical Techniques	CO1. Illustrate the basic understanding of common numerical methods used to obtain approximate solutions to otherwise intractable mathematical problems. CO2. Understand and interpret Numerical analysis which has enormous applications in the field of Science and some fields of Engineering. CO3. Solve numerical methods for various mathematical operations and tasks. CO4. Analyse and evaluate the accuracy of common numerical methods. CO5. Evaluate calculation and interpret of errors in numerical method. CO6. Design and able to solve the problem by Numerical Differentiation and Integration etc.
BCAOE104	Office Automation - I	CO1. Define, name various tools used in MS Word, MS Excel CO2. Compare, contrast, explain terms used in MS Word, MS Excel CO3. Apply MS Word & MS excel to create personalized documents and spreadsheets CO4. List, analyze various short cut keys used in MS excel, MS word CO5. Explain Mathematical operations used in MS Excel CO6. Build MS Word & MS excel documents for various case studies
BCAVC105	Mathematical Foundation of Computer Science	CO1. Illustrate the basic concepts of sets, matrices CO2. Understand the various concepts of relations and functions CO3. Teach to use mathematical induction to solve various linear and non-linear, asymptotic behaviour of a function etc. CO4. Analyse and illustrate representation of lattices and be able to determine their properties with Boolean algebra. CO5. Able to evaluate the use Algebraic Structures like various types of groups and permutation groups

		CO7. design posset and hasse diagrams and solve various types of logic by using prepositional logic
BCACC106	General English	CO1. To understand communication skills and soft skills. CO2. Use English Language effectively. CO3. To be able to create job applications and CVs in an effective manner. CO4. To apply the knowledge of Essential Skills in practical life. CO5. To explain the importance of professional and ethical attitude at the workplace. CO6. To develop essential professional skills among students.
BCAP11	Programming In C Lab	CO1. Simple programs to understand & create the concepts of data types, operations and expressions. CO2. By analyze and applying conditional and control statements. CO3. Implementing Concept of array and String to solve problem. CO4. Analyze and Implementation of functions, pointers, operation on pointers and dynamic storage allocation. CO5. Defining, applying and handling structures, array of structures, union and processing data CO6. To create a project using c programming language.
BCAP12	Computer Fundamental Lab	CO1. Name, define, find, relate, show the basics of computer CO2. Illustrate, outline, show, summarize word processing techniques CO3. Implement or apply word processing using spread sheets CO4. Analyze, compare examine the MS-Office techniques CO5. Assess MS-office tools and techniques CO6. Build, Design, develop new spreadsheets, PowerPoint presentation, word documents for give problem or case study
BCA201	Data Structure & File Organization	CO1. Able to understand& remember basics of C programming language and arrays & able to apply basic concepts of linked list & its types CO2. Able to understand & apply basic concepts of stack and queues through array and linked list CO3. To understand & apply the basic knowledge of Binary trees & its representation, traversing in BST, Threaded binary tree, Huffman algorithm etc. CO4. Able to understand the concepts of sorting and searching & Hashing techniques. CO5. Apply the basic knowledge of to implement File Structure CO6. Create the structure of stack, queues, trees etc. using array and linked list.
BCA202	Core Java	CO1. Understand the object oriented concepts

		CO2. Implement multi-threading programs CO3. Implement Exception handling CO4. Develop GUI based applications CO5. Understand file handling CO6. Design program based on files
BCAME203A	Computer Organization & Architecture	CO1. Outline the principles of computer design and understand the basic organization of computer and BUS architecture of the system. CO2. Understand the digital representation of data in a computer system and performing arithmetic calculations on data. CO3. Demonstrate the different types of control logic designs in processors, instruction set principles and instruction format. CO4. Illustrate the effect of addressing modes on the execution time of a program. CO5. Summarize the concepts of memory system, memory mapping. Evaluate the computer memory types based on performance and cost and interpret replacement algorithms. CO6. Integrate the concepts of input/output organization, different communication schemes and data transfer modes.
BCAME203B	Introduction To Logic	CO1. Define Logic and various Logic concepts and its application in Computer software development. CO2. Classify, compare, explain use of propositional logic in knowledge representation and truth verification. CO3. Make use of predicate logic in knowledge representation and truth verification. CO4. Examine, simplify, test the use of resolution in propositional logic. CO5. Deduct, explain, prove use of resolution in predicate logic. CO6. Build, create, combine, estimate application of Logics in day to day life
BCAOE204	Office Automation - II	CO1. Define, name various tools used in MS PowerPoint, MS Access CO2. Compare, contrast, explain terms used in MS PowerPoint, MS Access CO3. Apply MS PowerPoint, MS Access to create personalized presentations and databases. CO4. List, analyze various animation, used in MS PowerPoint, tables used in MS Access CO5. Explain various operations used in MS Access importing data from other databases etc.

		CO6. Build MS PowerPoint, MS Access documents for various case studies
BCAVC205	Cyber Security	CO1. Define a deeper understanding and familiarity with various types of cyberattacks, cybercrimes, vulnerabilities and remedies thereto. CO2. Understand and evaluate existing legal framework and laws on Cyber Security. CO3. Use the security aspects of social media platform and ethical aspects associated with use of social media. CO4. Analyse and evaluate the digital payment system security and remedial measures against digital payment frauds. CO5. Analyse and evaluate the Digital devices security and cyber security risks. CO6. Create Cyber Security Practices and Configuration of basic security policies and permissions.
BCACC206	Communication Skills	CO1. Associating knowledge, skills, and judgment with human communication that facilitate their ability to work. CO2. Categorizing the sub-skills of listening and speaking and be able to deliver effectively in the real time contexts. CO3. Imbibing the mechanics of writing professional testimonies and will help the students to construct effective paragraphs which benefit in a longer composition. CO4. Expressing the different forms of written communication techniques to make effective internal and external business correspondence. CO5. Displaying etiquette to work collaboratively with others considering various hindrances that occur and how to abolish them by being articulate and professional. CO6. Apply the knowledge of communication to enhance employability skills
BCA-P21	Data Structure & File Organization Lab	CO1. Analyze & understand the difference between linear and non linear DS & CO2. Implement array & link list and its types CO3. Understand and implement stack and queues using array and link list CO4. Understand and implement BST, addition and deletion of nodes, Huffman algorithm etc. CO5. To implement different sorting techniques like selection Bubble, insertion, merge quick sort etc. CO6. To create the data using linked list.
BCA-P22	Core Java Lab	CO1. Define basic data types and class objects and understand multithreading CO2. Understand exception handling

		CO3. Compare and contrast method overloading with method overriding CO4. Implement event handling CO5. Create java applet CO6. Plan java applets

Bachelor of Information Technology B.Sc. (IT) Ist Year 2022-23

Programme outcomes and Course Outcomes

PROGRAMME OUTCOMES (POS):

PO1	Computational knowledge	Acquire knowledge of Computing (algorithm and Coding) &Computing Specialization and Domain Knowledge of proper computing models for defined problems.
PO2	Problem analysis	Identify, formulate and analyze complex computational problems using mathematics, computer science conceptsand relevant domains.
PO3	Design/development of solutions	Ability to design efficient solution for complex, real-life problem, system software or Application Software as per needs and specifications of customers.
PO4	Conduct investigations of complex computing problems	Use research-based knowledge and research methods including design of experiments, analysis & interpretationof data & synthesis of information to reach valid conclusions.
PO5	Modern Tool Usage	Ability to demonstrate skills to use modern technologiesand tools to analyze and solve the software development problems.
PO6	Professional Ethics	Ability to perform professional practices in an ethical way, keeping in the mind cyber regulations, laws, Intellectual Property Right and norms of professional computing practices.

PO7	Life-Long Learning	Ability to develop confidence and ability for self- education and life-long learning in the broadest context oftechnological change. Ability to adapt or change the acquired knowledge with change in the technology.
PO8	Project management and finance	Ability to demonstrate knowledge & understanding the Software engineering management principles and apply them as a member & as a leader in a team to manage multidisciplinary projects. Ability to make budget, make estimates of time, effort, time and analyze risk and reschedule the projects

Course Outcomes (COs)

Course Code	Course Name	Course Outcome
BA101	Office Automation	CO1. Describe, understand word document and using it create reports. CO2. Describe, understand excel for creating tables, writing formulas and generating charts. CO3. Describe, understand PowerPoint and using it for presentation CO4. Describe, understand MS-Access and using it to create database that could be further used as a backend of an application. CO5. Understand how to use MS-Word, MS-Excel, MS-PowerPoint and MS-Access to work together and information can be shared. CO6. To create and design spreadsheets, advertisement, visiting cards, invitation letters etc. in MS word and power point presentation.
BS-102	Programming in 'C'	CO1. Identify the need and use of programming in real world environment CO2. Explain data types, variables and arithmetic operations in programming. CO3. Apply the concept of functions and pointer. Resolve Real world problems using functions and pointers. CO4. Analyze array and String concepts and implement array and string using functions and pointers. CO5. Appraise user defined data types including structure and union. CO6. Create programs for all programming problems
BSME103B	System Analysis & Design	CO1. Defining the concept of system, analysis, design, and system analyst and system development life

		cycle. CO2. Understand and describe the work done during the development of a system. CO3. Apply the fact-finding techniques to collect information to generate the system's requirements for the development of a system constructs. CO4. Analyze the system using data flow diagram, data dictionary and process specification tools to understand how each process is working and connected to others. Analyze the GUI, input/output screen and reports layouts. CO5. Evaluate the system planning tools and techniques and testing of software projects to ensure its correctness and completeness. CO6. Implement the newly developed system and giving training to the users.
BSOE104	Fundamentals of Computer and Information technology	CO1. To understand the fundamentals of Computers, Block Diagram of Computer, Computer hardware, Memory Architecture, to perform conversion from one number system to another number system. CO2. Will be able to analyze software, to identify type of software, to know the concept of Operating System and Functions of Operating System, to memorize the various commands of different Operating System. CO3. Students will be able to know concept of networking, Networking based reference model, Internet and different term related to internet. Different types of protocols associated with internet. CO4. Will be able to get idea about what is program and program paradigms, to develop strategies behind designing a program, to know the structure i.e., Top-Down and Bottom-Up approach of Modular Programming. CO5. Will be able to learn about different generations of Programming language, to know different methodologies to solve computation task, CO6. To create and design algorithm suitable flow chart of different problems
BSVC105	Basic Mathematics	CO1. Define the differentiation and integration of functions. CO2. Understand the various concepts of relations and functions like recursively defined functions. CO3. Teach to use mathematical induction to solve various linear and non-linear problems. CO4. Analyze posset and Hasse diagrams and solve various types of logic by using prepositional logic.

		CO5. Evaluate basic concepts of Probability and its application including Baye's Theorem CO6. Design and explain the basic operations of matrices and to solve the problems of matrices.
BSCC106	Environmental Studies	CO1. To gain and **remember** the knowledge of different aspects of environmental science CO2. To **understand and explain** about protection of wildlife and other natural resources. CO3. To gain and **apply** the knowledge about the different control technologies and awareness programs regarding environment. CO4. To appreciate the ethical, cultural and historical context of environmental issues and to understand the **relationship** between human and natural system. CO5. To identify, **evaluate** and solve environmental problems by utilizing the concept of environmental studies. CO6. To **design and create** various policies and practices for environment protection.
BS-P11	Lab-Office Automation	CO1. Describe the basics of computer CO2. Apply word processing techniques CO3. Implement word processing using spread sheets CO4. Analyse the problem-solving techniques CO5. Apply factoring and array techniques in real time CO6. To create and design spreadsheets, advertisement, visiting cards, invitation letters etc. in MS word and power point presentation
BS-P12	Lab Programming in 'C'	CO1. Identify the need and use of programming in real world environment CO2. Explain data types, variables and arithmetic operations in programming. CO3. Apply the concept of functions and pointer. In addition, resolve real world problems using functions and pointers. CO4. Analyze Array and String concepts and implement array and string using functions and pointers. CO5. Appraise user defined data types including structure and union. CO6. Create programs for all programming problems
BS-201	Operating System	CO1. To understand & remember different OS types and basic component of OS Architecture. CO2. Analyze issues in process management and evaluations of various scheduling algorithms. CO3. Understand process synchronization problem and provide (create) solution for critical section Problem and deadlock management.

		CO4.	Analyze and understand various memory management techniques.
		CO5.	Identify or evaluate the use of storage management techniques and solve various disk scheduling problems.
BS 202	Data structure using C	CO1.	Understand basics knowledge of data structure operations like insertion, deletion etc. for various data structure and their application.
		CO2.	Classify, compare, demonstrate the problem and create appropriate algorithm.
		CO3.	Apply, build, develop and implement various programs using C for nonlinear data structure.
		CO4.	Analyze and solve difficulties in the implementation of searching techniques.
		CO5.	Explain, deduct, assess, and evaluate basic terminology of trees.
		CO6.	Create, estimate, develop trees, sorting, searching techniques used in data structures
BS-ME203A	Cloud Computing	CO1.	To understand Cloud Computing concepts, classifications, and the basic cloud architecture.
		CO2.	Exploring various Cloud services and applications currently used in industry.
		CO3.	Understanding abstraction and virtualization techniques. And Security in the cloud computing environment.
		CO4.	Analyze the concept of Data Centres with Cloud Computing and examine the Use cases
		CO5.	Exploring major Cloud service platforms currently ruling the industry.
		CO6.	To have knowledge on various standards used and cloud security features.
BSME203B	Artificial Intelligence	CO1.	Solving basic AI problems and developing understanding of where and how AI can be used.
		CO2.	List the objectives and functions of modern Artificial Intelligence.
		CO3.	Define the concept of Artificial Intelligence.
		CO4.	Ability to Apply AI techniques to real-world problems solving to develop intelligent systems.
		CO5.	Select appropriately from a range of techniques when implementing intelligent systems.
		CO6.	Use classical Artificial Intelligence techniques, such as search algorithms, min max algorithm, alpha beta pruning etc.
BSOE204	Advance Fundamental of Computers &	CO1.	To Understand the fundamentals of Computer such as Block Diagram

	Information Technology	CO2. of Computer, Computer Hardware, Memory Architecture, to performconversion from one number system to another number system. CO3. Will be able to analyze software, to identify type of software, to knowthe concept of operating System and Functions of Operating System, to memorize the various commands of different Operating System. CO4. Students will be able to know concept of networking, Networking based reference model, Internet and different term related to internet. Different types of protocols associated with internet CO5. Will be able to get idea about what is program and program paradigms, to develop strategies behind designing a program, toknow the structure i.e. Top-Down and Bottom-Up approach of Modular Programming. CO6. Will be able to learn about different generation of Programming language, to Know different methodologies to solve computation task, using appropriateand suitable flow chart and algorithm.
BSVC205	Cyber Security and Cyber Law	CO1. Define a deeper understanding and familiarity with various types of cyberattacks, cybercrimes, vulnerabilities and remedies thereto. CO2. Understand and evaluate existing legal framework and laws on Cyber Security. CO3. Use the security aspects of social media platform and ethical aspects associated with use of social media. CO4. Analyse and evaluate the digital payment system security and remedial measures against digital payment frauds. CO5. Analyse and evaluate the Digital devices security and cyber security risks. CO6. Create Cyber Security Practices and Configuration of basic security policies and permissions.
BSCC206	Professional Communication	CO1. Students will attain and enhance competence in the four modes of literacy: writing, speaking, reading and listening CO2. Students will develop their ability as critical readers and writers CO3. Develop vocabulary and improve the accuracy in grammar. CO4. Produce words with right pronunciation CO5. Demonstrate positive group communication exchanges CO6. Plan effective communications

BS-P21	UNIX Lab	CO1. Able to understand the basic Unix architecture, commands and utilities of the UNIX operating system and to work confidently in Unix/Linux environment and open systems. CO2. Appraise various command usage of files and directories CO3. Show the working of vi editor in all its modes using various commands. CO4. Manage shell and processes using various commands. CO5. Write Shell scripts and C programs using vi editor. Demonstrate Unix administration and its environment. CO6. To Create Shell Scripting Programs
BS-P22	Data Structure Lab	CO1. Able to understand basics of C programming language and arrays. CO2. Able to understand basic concepts of linked list. CO3. To understand the basic concepts of stack and queues through array and linked list. CO4. To understand the basic knowledge of trees and graph. CO5. Able to understand the concepts of sorting and searching techniques.