**BISHOP COTTON WOMEN'S CHRISTIAN COLLEGE**

C.S.I Karnataka Central Diocese

#19,3rd Cross, C.S.I Compound, Mission Road, Bengaluru – 560027

Affiliated to Bengaluru City University

Contact No: 080 – 22212933/22129880

Email: principal@bcwcc.edu.in          Website: www.bcwcc.edu.in

## PROGRAM OUTCOME (CBCS SCHEME)

- Improve their computer literacy and basic understanding of operative systems.
- Learn how to organize information efficiently using appropriate software.
- Develop the skills to present their ideas and creativity effectively and efficiently.
- Awareness on ethics, values, sustainability and creativity aspects and the ability and mindset to continuously update and innovate.
- Ability to understand, analyze and develop computer programs in the areas related to algorithm, system software, web design and networking for efficient design of computer based system.
- Apply standard software engineering practices and strategies in software project development using open source programming environment to deliver a quality of product for business success.
- Ability to know various issues, latest trends in technology development and thereby innovate new ideas and solutions to existing problems.
- Analyze and apply latest technologies to solve problems in the areas of computer applications.
- Ability to communicate effectively.
- Ability to use appropriate techniques, skills, and tools necessary for computing practice.
- Recognition of the need for and ability to engage in continuing professional development.
  - Understand the fundamental concepts of Computers, Business

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## PROGRAM SPECIFIC OUTCOME(CBCS SCHEME)

- Understand, analyze and develop computer programs in the areas related to algorithm, system software, web design and networking.
- Apply the standard Software Engineering strategies in software project development.
- Apply innovative ideas and solutions to existing problems.
- Able to function effectively on teams to accomplish shared computing design, evaluation and implementation of goals.
- Able to work as a responsible computer professional with professional ethics.

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## COURSE OUTCOME

| Semester | Units | Learning Outcome |
|---|---|---|
| | **Course: Problem solving techniques using C: BCA 103T** | |
| | Unit I | To understand the basic programming concepts |
| | Unit II | Learn about I/O operations, branching and looping |
| | Unit III | Learn to write programs using arrays. |
| **I Semester** | Unit IV | Understand and write programs using structures, unions and pointers. |
| | Unit V | Learn about files, command line arguments and Macros |
| | **Course: Digital Electronics: BCA104T** | |
| | Unit I | Understand the concept of network theorems and AC fundamentals |
| | Unit II | Learn the working of semiconductor devices and digital IC classifications. |
| | Unit III | Learn about the number systems, conversions and Karnaugh maps |

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|---|---|---|
| | Unit IV | Design logic circuits using logic gates. |
| | Unit V | Learn about sequential circuits and flip flops. |
| **II Semester** | **Course: Data Structures: BCA203T** | |
| | Unit I | Understand the basic data structures for storage and retrieval of data. Ability to do different string operations |
| | Unit II | Understand the array structure. Ability to handle operations like searching, insertion, deletion, retrieval etc |
| | Unit III | Understand the linked list structure and various operations on linked lists. |
| | Unit IV | Learn stack and queue and implement it using array and linked lists. |
| | Unit V | Ability to understand tree and graph concepts |
| | **Course: Database Management System: BCA204T** | |
| | Unit I | Learn the concepts of database, database users,DBMS Architecture andit's classification |
| | Unit II | Understand the concept of Entity Relationship Model, Buffereing and File organization and learn to create and access the database. |

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|---|---|---|
| | Unit III | Learn the concept of Normalization, constraints, Relational Algebra and the operations associated with it. |
| | Unit IV | Learn to write queries using SQL |
| | Unit V | Understand the techniques of Transaction Processing and Concurrency Control. |
| **III Semester** | **Course: Object Oriented Programming using C++: BCA303T** | |
| | Unit I | Understand the basic concepts of Object Oriented Programming |
| | Unit II | Learn the concepts of Objects and Classes, Constructors, Destructors and to write programs using these concepts. |
| | Unit III | Understand the concept of Operator Overloading, types of Inheritance and Access Specifiers. |
| | Unit IV | Learn the concept of Virtual functions, Friend function, Templates and Exception Handling |
| | Unit V | Learn the concept of Streams, File pointers and Command line arguments |
| | **Course: Operating System: BCA305T** | |

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|---|---|---|
| | Unit I | Be familiar with types of operating systems, functions and structure of O.S. Understand process scheduling and CPU scheduling |
| | Unit II | Understand synchronisation techniques, deadlock and recovery |
| | Unit III | Master various memory management techniques paging and segmentation including virtual memory. |
| | Unit IV | Understand file system implementation and disk management techniques |
| | Unit V | Understand the various protection and security mechanisms used in operating systems. |
| **IV Semester** | **Course: Visual Programming: BCA403T** | |
| | Unit I | Understand the concept of Event driven programming and learn how to use the different controls available in Visual Basic 6.0 |
| | Unit II | Learn to write programs using different programming constructs, create menus and use Microsoft common controls |
| | Unit III | Learn the additional features available like DLL and windows API |
| | Unit IV | Understand and learn the concepts of Visual C++ components and write simple programs . |
| | Unit V | Learn how to interface with other applications |
| | **Course: Unix Shell Programming: BCA404T** | |

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| | Unit I | Understand the fundamental concepts of operating system, its different types and the concepts of process scheduling commands. |
| | Unit II | To do shell programming on UNIX operating system and to check disk space, disk partitioning and to do the file compression. |
| | Unit III | To work with the vi editor, understand the basic unix commands, pipes and filters. |
| | Unit IV | Understand the basic constructs like if-else and looping control structures. |
| | Unit V | Implement Unix system communication and understand the roles of a System Administrator. |
| | **Course: Operation Research: BCA405T** | |
| | Unit I | Formulate a real-world problem as a mathematical programming model |
| | Unit II | Solve specialized linear programming problems like the transportation problems |
| | Unit III | To give practical exposure to assignment problems |
| | Unit IV | help to facilitates the learning of network analysis and solve network models like shortest path ,minimum spanning tree and maximum flow problems |
| | Unit V | To give practical exposure to sequencing and game theory |
| | **Course: Data Communication and Networks: BCA501T** | |

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| **V Semester** | Unit I | Learn the concepts of Communication Network and services, OSI Reference Model and digital communication. |
| | Unit II | Learn the different transmission systems, Polynomial Code and Routing Control. |
| | Unit III | Understand Peer-to-Peer Protocols |
| | Unit IV | Learn about the Medium Access Control Protocols and Channelization. |
| | Unit V | Learn about the different LAN Standards, Packet switching Networks and Congestion control algorithms. |
| | **Course: Software Engineering: BCA502T** | |
| | Unit I | Understand the different software products and process, Process models and Requirement Specification |
| | Unit II | Learn the concept of Software prototyping and Design Strategies |
| | Unit III | Learn design principles and to draw Data Flow Diagrams |
| | Unit IV | Understand software reliability and reusability, Fault avoidance and tolerance and Application System reuse. |

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| | Unit V | Learn about Software Verification and Validation and understand the different management issues in Project Management. |
| | **Course: Computer Architecture: BCA503T** | |
| | Unit I | To design a simple circuit using fundamental building blocks, understand basic structure of computer, simplify Boolean algebra and K-maps and to understand the digital IC families. |
| | Unit II | To understand binary data representation of numbers and to understand data transfer operations. |
| | Unit III | To perform computer arithmetic operations, understand control unit operations and memory reference instructions. |
| | Unit IV | To understand the block diagram of Bus Organization for CPU registers, different instruction formats and addressing modes. |
| | Unit V | Ability to understand the concept of I/O organization, cache mapping and data transfer. |
| | **Course:Java Programming: BCA504T** | |
| | Unit I | Understand the concepts of Java , decision making and looping and write simple programs using these concepts. |
| | Unit II | Learn the concepts of classes, arrays strings, vectors, method overriding and arrays |

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| | Unit III | Learn how to create interfaces, packages and threads and multithreaded programming. |
| | Unit IV | Manage Exceptions and write applet programs using HTML. |
| | Unit V | Understand Graphics programming and Files. |
| | **Course: Microprocessor and Assembly Language: BCA505T** | |
| | Unit I | Understand the architecture and organization of 8085 and interfacing devices |
| | Unit II | Learn the classification of instruction set of 8085 and write simple assembly language programs |
| | Unit III | Ability to analyse, write and test programs. Analyse the time delay in each program and learn to convert into different representations |
| | Unit IV | Ability to design the memory interface and I/O interface. Understand basic principles of interrupt |
| | Unit V | Understand the architecture and operations of programmable interface devices. |
| | **Course: Theory of Computation: BCA601T** | |
| | Unit I | To construct finite state machines to solve problems in computing. |
| | Unit II | Understand, design, construct, analyse and interpret Regular languages, Expression and Grammars |

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| **VI Semester** | Unit III | Understand, design, analyze and interpret Context Free languages, Expression and Grammars |
| | Unit IV | Design different types of Push down Automata as Simple parser |
| | Unit V | To construct and analyse Turing Machine for formal language and express the understanding of the decidability and decidability problems. |
| | **Course: System Programming: BCA602T** | |
| | Unit I | Understand the various components of system programming and the machine structure of IBM360. |
| | Unit II | Design a single pass and two pass assembler. Learn the different types of search and sorting algorithms. |
| | Unit III | Implement macros with two pass and single pass assembler |
| | Unit IV | Understand the implementation of different loaders and linkers. |
| | Unit V | Ability to design a compiler. |
| | **Course: Cryptography and Network Security: BCA603T** | |
| | Unit I | Learn about the Security goals and mathematics of cryptography. |
| | Unit II | Understand the concept of Traditional Symmetric Key Ciphrs, Data Encryption Standard and Advanced Encryption Standard. |

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| | Unit III | Learn the different Symmetric Key Ciphers and the different algorithms used. |
| | Unit IV | Learn about MD Hash Family, Key Management and Hijacking |
| | Unit V | Understand how security is implemented at the Application Layer. |
| | **Web Programming:BCA604T** | |
| | Unit I | Understand the basic syntax of mark up language and use it to display information in web pages |
| | Unit II | Learn to use CSS which is used to style the pages. Develop simple pages |
| | Unit III | Learn the basic syntax of javascript. Understand the role of javascript in web page creation |
| | Unit IV | Develop dynamic web page using javascript. |
| | Unit V | Understand XML document. Ability to develop a web application. |

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# PROGRAM OUTCOME  (NEP 2020)

**PO1**:- **Computing knowledge and Practical applications**:   Recognize and appreciate the role of computing in a wide variety of fields by distinguishing the structure and functions of modern computer systems in terms of hardware and software.

**PO2**:- **Project Management**: Demonstrate structure of scientific principles in multidisciplinary environment.

**PO3**:- **Ethics and Communication**: Apply ethical principles and communicate effectively on complex activities with the scientific approach.

**PO4**:- **Modern Technical Tools Usage**: Create, select and apply appropriate techniques, resources in modern computing including modeling to advanced scientific activities.

**PO5**:- **Life-long Learning**: Recognize the need and apply to engage in independent and life-long learning in the broadcast context of technological change.

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## COURSE OUTCOME (NEP 2020)

### I SEM: PROBLEM SOLVING TECHNIQUES

1. Describes basic programming techniques and elements.

2. Explains the programming techniques.

3. Explains programming techniques.

4. Describes pointers, structures, and other derived data types.

5. Explains file management techniques.

### I SEM: DATA STRUCTURES

1. Understand the introduction and overview of programming.

2. Understand and apply the array representation

3. Understand and apply the concept of Linked lis

4. Understand and describe the implementation of the stack.

5. Describe and apply the concept of graph and tree.

### I SEM: DISCRETE MATHEMATICS

1. Describes Set, Relation, function, and mathematical logic

2. Explains the fundamental concepts of matrix and various operations and application of matrix

3. Explains the concept of the logarithm, permutation, and combination

4. Describes the concept of group and its various operation

5. Explains the basic concept of analytical Geometry in two Dimensions

### II SEM: DATA BASED MANAGEMENT SYSTEM

1. Describes the basics of the database management system.

2. Explains the concepts of diagrammatic representation

3. Explains programming techniques

4. Describes SQL and PL/SQL.

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5: Explains transaction processing concepts and interleaving techniques, locks, etc.

## II SEM: COMPUTER ARCHITECTURE

1. Explain the digital logic circuits

2. Apply the data representation

3. Understand the basic computer organisation and design

4. Describe the central processor organization

5. Understand the input-output organisation

## II SEM: OOP'S USING JAVA

1. Understand the basic concepts of the Internet and the history of Java

2. Clarify the concepts of arrays, classes, strings, and vectors

3. Understand the concept of Interface and Packages

4. Understand the logic of Exceptions and Applet

5. Understand the concept of Graphics programming

## III SEM: COMPUTER NETWORKS

1. Understands basic concepts of networking and digital transmission

2. Explains the properties of media and various transmission systems

3. Understands the concept of Peer-to-Peer protocols and service models

4. Describes Local Area Networks and Medium Access Control Protocols

5. Understand LAN standards, wireless LANs, packet network topology with an overview of routing and congestion in packet.

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## III SEM: OPERATING SYSTEM

1. Describes the internal architecture Operating System.

2. Explains the concepts of Process Synchronization and deadlock.

3. Explains memory management system.

4. Describes file and disk management.

5. Explains the protection and security of the system.

## IV SEM: SOFTWARE ENGINEERING

1. Explain Software Products and Software process, Process models

2. Software Prototyping and Software Design

3. Understand Object-Oriented & function-oriented design

4. Describe Software Reliability and reusability

5. Understand Software Verification and Validation

## IV SEM: INTERNET TECHNOLOGIES

1. Understand the basic concepts of Internet and web browser

2. Clarify the HTML & XHTML

3. Understand the concept of Javascript

4. Understand the principle of the DOM model

5. Understand the concept of DDL

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## V SEM: ARTIFICIAL INTELLIGENCE

1. Understand the various characteristics of problem-solving agents and apply problemsolving through search for AI applications.
2. Appreciate the concepts of knowledge representation using Propositional logic and predicate calculus and apply them for inference/reasoning.
3. Obtain insights about Planning and handling uncertainty through probabilistic reasoning and fuzzy systems.
4. Understand basics of computer vision and Natural Language Processing and understand their relevance in AI applications.
5. Obtain insights about machine learning, neural networks, deep learning networks andtheir significance.

## V SEM: DATA ANALYTICS

1. Explore the fundamental concepts of data analytics
2. Recognize and conduct statistical inference to solve engineering problems.
3. Summarize and present data in meaningful ways
4. Select the appropriate statistical analysis depending on the research question at hand
5. Effectively and clearly communicate results from analyses performed to others

## VI SEM: WEB PROGRAMMING

1. Understand the basics of Web Programming concepts
2. To build dynamic web pages with validation using JavaScript objects and by applying different event-handling mechanisms.
3. Analyze various PHP library functions that manipulate files and directories.
4. To develop modern interactive web applications using PHP and XML

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## VI SEM: QUANTITATIVE TECHNIQUES

1. Master fundamental mathematical concepts like numbers, HCF, LCM, and probability. Develop problem-solving skills for series, codes, and classification.
2. Acquire skills for time-related problems, distance, and speed. Learn to calculate areas, volumes, and interpret data graphically.
3. Understand financial mathematics and reasoning. Gain knowledge of research methods, reading comprehension, and effective communication.
4. Learn teaching methodologies, research basics, and reading comprehension. Understand effective classroom communication.

## VI SEM: DATA MINING

1. Introduce basic data mining tasks and techniques, such as classification, regression, and association rules. Explore the development and issues of data mining from a database perspective.
2. Learn classification algorithms like regression, Bayesian classification, and K Nearest Neighbors.
3. Understand clustering techniques, including hierarchical and partitional algorithms.
4. Familiarize with association rule mining and parallel/distributed algorithms. Compare various approaches for rule mining and incremental rule generation.

## VI SEM: GRAPHICS

1. Explore computer graphics applications and display devices. Learn line and circle drawing techniques and area filling methods.
2. Master 2D transformations and clipping techniques. Understand window-to-viewport transformations.
3. Gain knowledge of 3D graphics, transformations, and hidden surface removal.
4. Explore graphical input devices and techniques for user interaction.

## VI SEM: CYBER CRIMES, CYBER LAWS AND INTELLECTUAL PROPERTY RIGHT

1. Understand cybercrimes, their nature, legal remedies and as to how report the crimes through available platforms and procedures.
2. Recognize various privacy and security concerns on social media and e-commerce platforms.
3. Use basic tools and technologies to protect their devices.
4. Understand digital environment and IPR issues

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## VI SEM: MACHINE LEARNING

1. Learn the basics of machine learning, understanding its uses, challenges, and various applications.
2. Build practical data skills, covering data collection, analysis, visualization, and preparation.
3. Become skilled in using classification and regression algorithms, including selecting, training, and evaluating models.
4. Dive into advanced clustering and specialized applications, using methods like K-Means, DBSCAN, and others.

## VI SEM: MOBILE APPLICATION DEVELOPMENT

1. Understand the basic concepts of Mobile application development
2. Design and develop user interfaces for the Android platforms
3. Apply Java programming concepts to Android application development and create an application using database

## VI SEM: MACHINE LEARNING LAB

1. Achieve proficiency in setting up Python, installing vital libraries, and configuring essential tools.
2. Demonstrate competence in data manipulation, dataset loading, and the creation of insightful visualizations.
3. Exhibit the ability to preprocess data, address missing values, perform categorical encoding, and implement fundamental machine learning algorithms.
4. Develop an understanding of clustering techniques, create cluster visualizations, and interpret decision tree splits.

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## VI SEM: ELECTRONIC CONTENT DESIGN

- Understand the principles of visual design and user experience.
- Create and optimize images and graphics for digital media.
- Design responsive and user-friendly websites.
- Produce multimedia presentations.
- Develop content for social media platforms.
- Evaluate and critique electronic content for effectiveness.
- Apply copyright and ethical considerations in digital content creation.

## VI SEM: OPERATION RESEARCH

- Formulation of optimization model and applying appropriate optimization techniques for decision making.
- Solve linear programming problems using appropriate optimization techniques.
- Finding the optimal strategy for Minimization of Cost of shipping of products from source to Destination.
- Optimizing the allocation of resources to Demand points in the best possible way.

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## PROGRAM OUTCOME (SEP 2024)

| | | |
|---|---|---|
| PO1 | Computational Knowledge | Acquire in-depth computational and mathematical knowledge with an ability to abstract and conceptualise from defined problems and requirements. |
| PO2 | Dynamic Problem-Solving Skill | Identify, formulate, and exhibit strong analytical and dynamic problem-solving skills to address evolving computational challenges. |
| PO3 | Innovative System Analysis and Design/ Development | Design and evaluate solutions for complex problems in Data Science, AI & ML, and Full Stack Development, considering societal, cultural, and environmental factors. |
| PO4 | Investigate complex computing problem | Conduct literature surveys, analyze information, and design experiments using appropriate research methods to derive valid conclusions in relevant domains. |
| PO5 | Use of modern tools/ Adaptive programming proficiency | Select, adapt, and apply modern IT tools and programming languages effectively in Data Science, AI & ML, and Full Stack Development to solve diverse computing challenges. |
| PO6 | Knowledge Optimization | Modify algorithms or software systems to improve efficiency or resource utilization. |
| PO7 | Life Long Continuous learning and Technology Adaptability | Pursue lifelong learning to stay updated with emerging technologies in Data Science, AI & ML, and Full Stack Development for sustained employability. |
| PO8 | Soft skills and collaborative teamwork | Communicate effectively, enhance interpersonal skills, and collaborate in multidisciplinary teams essential for success in professional environments. |
| PO9 | Cyber Security Proficiency | Understand cyber threats, develop secure software, and protect sensitive data in Data Science, AI & ML, and Full Stack Development applications. |
| PO10 | Ethical and Professional Conduct | Adhere to ethical standards and professional practices in Data Science, AI & ML, and Full Stack Development roles and responsibilities. |

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| PO11 | Employability | Identify market trends, upgrade skills accordingly, and enhance employability in Data Science, AI & ML, and Full Stack Development careers. |
|------|---------------|------------------------------------------------|
| PO12 | Innovation and Entrepreneurship | Identify opportunities, innovate, and create value through Data Science, AI & ML, and Full Stack Development projects for personal growth and societal impact. |

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## COURSE OUTCOME (SEP 2024)

### DISCRETE STRUCTURE

CO1 Apply Set theory, Relations, Functions and Mathematical Induction for solving problems

CO2 Getting familiar with counting techniques and Mathematical Logic, and apply the same toaddress the real life problems

CO3 Learn different operations of a Matrix and apply them to solve real life problems.

CO4 Apply graph theory concepts to solve the problems of real world.

### PROBLEM SOLVING TECHNIQUE

CO1 To understand algorithmic strategies for enhancing problem-solving proficiency

CO2 Demonstrate problem solving tools and techniques using C.

CO3 To analyze the given problems and use appropriate algorithms.

CO4 To implement sorting and searching techniques to develop programs.

### COMPUTER ARCHITECTURE

CO1 Understand various arithmetic and logical operations on different types of numbers todesign an arithmetic and logic unit.

CO2 Demonstrate Design and implement sequential logic circuits using ICs

CO3 Analyze the basics of computer organization and its design and the basic processing unit

CO4 Implement the instruction sets and to develop assembly language programming skills.

**BISHOP COTTON WOMEN'S CHRISTIAN COLLEGE**

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## DATA STRUCTURE

CO1      Understand basic concepts of data structures.

CO2      Analyzing and exploring various ways of storing data using Array and Linked list.

CO3      Demonstrate stack and queue data structures and their applications

CO4      Analyze and implement various non linear data structures.

## OBJECT ORIENTED PROGRAMMING USING JAVA

CO1 - Understand object-oriented programming concepts

CO2 - Demonstrate the important feature of Object-oriented programming

CO3 - Examine event handling, String handling, and exception handling concepts

CO4 - Implement concepts to solve real-world problems

## OPERATING SYSTEMS

CO1 To analyze the memory management and its allocation policies

CO2 To understand synchronization and deadlock conditions and their possiblesolutions

CO3 To discuss the storage management policies with respect to different storage

CO4 To evaluate the concept of the operating system with respect to Linux architecture and commands