

# DEPARTMENT OF B.C.A. (SCIENCE)

## BCA(Science)

### Program Outcomes:

After successful completion of **BCA(Science)** Programme students will be able to:

**PO1: SCIENCE KNOWLEDGE :**

Apply the knowledge of mathematics, science, electronics, computers science fundamentals, and a specialization to the solution of complex science problems.

**PO2: DESCRIBE / DESIGN/DEVELOPMENT OF SOLUTIONS :**

Design solutions for complex computer science problems and design system components or processes or programs that meet the specified needs with appropriate consideration for public health and safety and cultural, societal, and environmental considerations. i.e. to Discuss /design software development fundamentals, including programming, data structures, algorithms and complexity.

**PO3: CONDUCT INVESTIGATIONS OF COMPLEX PROBLEMS :**

Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. i.e. Illustrate the concepts of systems fundamentals, including architectures and organization, operating systems, networking and communication.

**PO4: MODERN TOOLS/SOFTWARE /PROGRAMMING LANGUAGE USAGE:**

Create, select, and apply appropriate techniques, resources, and modern IT tools, including prediction and modeling to complex activities, with an understanding of the limitations. i.e., Gain the knowledge about software engineering fundamentals, including software analysis and design, evaluation and testing, and software Engineering processes.

**PO5: ENVIRONMENT AND SUSTAINABILITY:**

Understand the impact of the professional IT solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO6: PROFESSIONAL SKILLS:**

Develop hard skills and soft skills through various tools, case studies. Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share the views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups. Understand the roles and responsibilities of the professional.

**PO7: PRACTICAL IMPLEMENTATION:**

Apply computer literacy of students and basic understanding of operative systems and working knowledge of software commonly used in academic and professional environments.

**PO8: COOPERATION AND TEAMWORK:**

Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.

**PO9: ENTREPRENEURIAL DEVELOPMENT:**

Impart knowledge required for planning, designing, and building Complex Software Application, automated systems. Develop business expertise, analytical skills, and financial literacy necessary in the IT industry.

**PO10: GOAL ORIENTED AND LIFELONG LEARNING:**

Ability to acquire knowledge and skills, including learning how to learn that are necessary for participating in learning activities throughout life. Develop technical knowledge for immediate employment and for life-long learning in advanced areas of computer science and related fields.

**PO11: CRITICAL THINKING FOR PROBLEM SOLVING:**

Identify, analyze, formulate, Design and develop the real-world requirements by critical thinking for complex problems in IT enabled services.

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## BCA(Science)

### Course Outcome:

#### F. Y. BCA(Science) SEMESTER I

##### **BCA111: Fundamentals of Computers:**

After successful completion of this course, students will be able to:

- CO1: Define working of computers and peripherals, types of software and languages;
- CO2: Troubleshoot the computer systems and use utility software;
- CO3: Choose commands and features of operating systems and application software;
- CO4: Use open-source software.

##### **BCA112: Problem Solving and C Programming:**

After successful completion of this course, students will be able to:

- CO1: Define algorithms and explain their characteristics, Formulate Algorithm and draw flowchart to solve a given problem, demonstrate ability to use top-down program design;
- CO2: Explain use of appropriate data types, control statements;
- CO3: Input-output Statements in C;
- CO4: Control & Iterative Structures;
- CO5: Concept of Functions and storage classes;
- CO6: Introduction to the concept of arrays- 1D and 2 D.

##### **BCA113: Applied Mathematics:**

After successful completion of this course, students will be able to:

- CO1: Relate and apply techniques for constructing mathematical proofs and make use of appropriate set operations, propositional logic to solve problems;
- CO2: Use function or relation models to interpret associated relationships;
- CO3: Apply basic counting techniques and use principles of probability;
- CO4: Given data, students can compute various descriptive statistics;
- CO5: Use appropriate Sampling Techniques;

CO6: The students will be able to compute probabilities and conditional probabilities in appropriate ways;

CO7: The students will be able to examine various hypotheses involved.

**BCA114: Business Communication:**

After successful completion of this course, students will be able to:

CO1: Apply business communication strategies and principles to prepare effective communication for domestic and international business situations;

CO2: Identify ethical, legal, cultural, and global issues affecting business Communication;

CO3: Participate in team activities using collaborative work skills;

CO4: Communicate via electronic mail, Internet, and other technologies;

CO5: Deliver an effective oral business presentation.

**BCA115: Fundamentals of Computers Laboratory:**

After successful completion of this course, students will be able to:

CO1: Install operating system and execute various commands;

CO2: Effectively use various features of application software ;

CO3: Create and use spreadsheets effectively;

CO4: Prepare effective Presentation.

**BCA116: C Programming Laboratory:**

After successful completion of this course, students will be able to:

CO1: Formulate an algorithm and draw flowchart for the given problem;

CO2: Implement the given algorithm in C;

CO3: Write programs using appropriate data types and control structures in C.

**BCA117: Applied Mathematics Laboratory:**

After successful completion of this course, students will be able to:

CO1: Students will be able to apply mathematical and statistical concepts to solve problems;

CO2: Students will get familiarize with R syntax;

CO3: Students will be able to use R to perform statistical operations and data visualization.

**BCA118: Business Communication Laboratory:**

After successful completion of this course, students will be able to:

- CO1: Effectively listen to lectures, public announcements, and news on TV and radio;
- CO2: Engage in telephonic conversation;
- CO3: Communicate effectively and accurately in English;
- CO4: Use spoken language for various purposes;
- CO5: Demonstrate ability to prepare documents used in business Correspondence.

**F. Y. BCA(Science) SEMESTER II****BCA121: Computer Organization:**

After successful completion of this course, students will be able to:

- CO1: Describe the logic gates arithmetic rules, number system and identify the terms related to computer organization;
- CO2: Understand the Boolean algebra and design logic diagrams;
- CO3: Describe Combinational and sequential circuits, and build basic circuit diagram using ICs and logic gates;
- CO4: Understand the organization of the Control unit, Arithmetic and Logical unit, Memory unit and the I/O unit;
- CO5: Estimate the knowledge about microprocessor, electronics memories and microcontrollers.

**BCA122: Advanced C Programming:**

After successful completion of this course, students will be able to:

- CO1: Write programs using pointers, structures and unions;
- CO2: Use Preprocessor directives;
- CO3: Manipulate strings using library functions;
- CO4: Write programs to perform operations on Files.

**BCA123: Operating Systems Concepts:**

After successful completion of this course, students will be able to:

- CO1: Explain basic concepts of operating system;
- CO2: Use basic Linux commands and Linux documentation;
- CO3: Write shell scripts.

**BCA124: Database Management Systems – I:**

After successful completion of this course, students will be able to:

- CO1: Understand various file organizations;
- CO2: Learn different data models, structure of DBMS;
- CO3: Design E-R Model for given requirements and convert the same into database tables;
- CO4: Formulate database queries using SQL;
- CO5: Design a database in appropriate normal form.

**BCA125: Computer Organization Laboratory:**

After successful completion of this course, students will be able to:

- CO1: Design and implement combinational circuits;
- CO2: Design and implement sequential circuits;
- CO3: Translate real world problems into digital logic formulations.

**BCA126: Advanced C Programming Laboratory:**

After successful completion of this course, students will be able to:

- CO1: Write programs using pointers, structures and unions;
- CO2: Use Preprocessor directives;
- CO3: Manipulate strings using library functions.

**BCA127: Operating Systems Laboratory:**

After successful completion of this course, students will be able to:

- CO1: Install Linux and packages, configure environment;
- CO2: Use commands and editors and use documentation;
- CO3: Configure Security and network environment.

**BCA128: Database Management Systems – II Laboratory:**

After successful completion of this course, students will be able to:

- CO1: Prepare E-R Diagram for the given problem statement;
- CO2: Formulate appropriate SQL DDL Queries;
- CO3: Formulate appropriate SQL DML Queries.

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### Course Outcome:

#### S. Y. BCA(Science) SEMESTER III

##### **BCA231: Data Structures:**

After successful completion of this course, students will be able to:

- CO1: Apply appropriate data structures for the given problem;
- CO2: Design an efficient algorithm for the given problem;
- CO3: Determine the time and space complexity of a given algorithm.

##### **BCA232: Database Management Systems – II:**

After successful completion of this course, students will be able to:

- CO1: Formulate SQL queries using Advanced SQL functions;
- CO2: Perform database operations using PL SQL functions;
- CO3: Compare and contrast different concurrency control techniques;
- CO4: Understand different recovery techniques;
- CO5: Apply mechanisms for database security;
- CO6: Analyzes various database system architecture.

##### **BCA233: Computer Networks:**

After successful completion of this course, students will be able to:

- CO1: Understand the basic networking concepts, protocols and standards. Analyze the requirements for a given organization and select appropriate network architecture, topologies;
- CO2: Explain the OSI reference model used in the network. Describe OSI reference model and TCP/IP model;
- CO3: Understand different Transmission Impairments. Describe the performance of the network. Comprehend the basic working principles behind switching techniques used in Communication channels;
- CO4: Describe the data link layer services, framing, and error detection code. Discuss various design issues and various protocols used in data link layer;
- CO5: Understand Classful and Classless Address. Compare IPv4

Addresses and IPv6 Addresses;

CO6: Understand services and protocols used at Transport Layer and Application Layer. Summarize the DNS. Discuss WWW architecture, E-mail, and HTTP.

**BCA234: Data Structures Laboratory:**

After successful completion of this course, students will be able to:

- CO1: Apply appropriate data structures for the given problem complexity of a given algorithm;
- CO2: Design an efficient algorithm for the given problem and implement it using C programming;
- CO3: Determine the time and space complexity of a given algorithm.

**BCA235: Database Management Systems-II Laboratory:**

After successful completion of this course, students will be able to:

- CO1: Formulate SQL queries using advanced features;
- CO2: Write stored procedures, cursors and triggers using PL/PostgreSQL SQL;
- CO3: Design a database using database normalization technique.

**BCA236: Computer Network and Web Programming Lab:**

After successful completion of this course, students will be able to:

- CO1: Use HTML and CSS to design a website;
- CO2: Write java scripts;
- CO3: Interpret and formulate XML queries.

**EVS-231: AEC Course – Environmental Science –I:**

After successful completion of this course, students will be able to:

- CO1: Articulate the interconnected and multidisciplinary nature of environmental studies; Demonstrate an integrative approach to environmental issues with a focus on sustainability;
- CO2: Develop an understanding of the differences in the structure and function of different types of ecosystems;
- CO3: Understand the Natural Resources, experience positive and negative environmental impacts, on land, water & Energy resource;
- CO4: Use critical thinking, problem-solving, and the methodological



approaches of the Biodiversity, its Conservation, and humanities in environmental problem solving.

**LA-231: AEC Course – Language –I:**

After successful completion of this course, students will be able to:

- CO1: To heighten their awareness of correct usage of English grammar in writing and speaking;
- CO2: To improve their speaking ability in English both in terms of fluency and comprehensibility;
- CO3: To improve Students will give oral presentations and receive Feedback on their performance;
- CO4: To enhance their reading fluency skills through extensive reading;
- CO5: To improve their ability to write academic papers, essays and summaries using the process approach.

**S. Y. BCA(Science) SEMESTER IV**

**BCA241: Object Oriented Programming and C++:**

After successful completion of this course, students will be able to:

- CO1: Compare procedural and object-oriented programming;
- CO2: Apply basic principles of OOP like classes, objects, Inheritance, polymorphism, abstraction, encapsulation etc.
- CO3: Understanding other programming paradigm like data types, operators, keywords, access specifier, arrays, namespace, manipulation;
- CO4: Understand dynamic memory management techniques using pointers, constructors, destructors, function and Operator overloading;
- CO5: Classify inheritance with the understanding of early and late Binding;
- CO6: Understand the concepts of File handling and Exception handling.

**BCA242: Computer Network & Web Technology:**

After successful completion of this course, students will be able to:

- CO1: Develop web-based application using suitable client side and server-side web technology;
- CO2: Build Dynamic web site using server-side PHP Programming and

Database connectivity;  
CO3: Build applications using AJAX and XML.

**BCA243: Software Engineering:**

After successful completion of this course, students will be able to:

- CO1: TO understand the system concept and Identify unique features of various software application domains and classify software applications;
- CO2: TO Choose and apply appropriate lifecycle model of software Development;
- CO3: To Identify user needs and formulate software specifications, and Able to develop the SRS document for project;
- CO4: TO Analyze software requirements by applying various modeling Techniques;
- CO5: To identify different types of risks in software development and Able to distinguish different testing strategies and it's working;
- CO6: To Estimate the quality of software process and make software Maintains.

**BCA244: C++ Programming Laboratory:**

After successful completion of this course, students will be able to:

- CO1: Compare and contrast procedural and object oriented programming;
- CO2: Apply principles of OOP;
- CO3: Design and develop applications using object oriented programming language C++.

**BCA245: Web Technology Laboratory:**

After successful completion of this course, students will be able to:

- CO1: Design and implement static and dynamic websites using appropriate client side and server-side technologies;
- CO2: Build Dynamic web site using PHP Programming and Database Connectivity;
- CO3: Build applications using AJAX and XML and web services.

**BCA246: Python Programming Laboratory:**

After successful completion of this course, students will be able to:

CO1: Write programs using Python programming constructs;

CO2: Develop applications using Python programming.

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### Course Outcome:

#### T. Y. BCA(Science) SEMESTER V

##### **BCA 351: DSE I (Programming in Java):**

After successful completion of this course, students will be able to:

- CO1: To learn implementation of object-oriented concepts with Java.
- CO2: To understand collection classes and interfaces.
- CO3: To know the process of application development using Graphical User Interface (GUI).
- CO4: To acquire knowledge about handling databases using Java.
- CO5: To study web components for developing web applications.

##### **BCA 352: DSE II - Data Mining and Data Science:**

After successful completion of this course, students will be able to:

- CO1: Identify the key processes of data mining, data warehousing and knowledge discovery
- CO2: Design data warehouse with dimensional modeling and apply OLAP operations.
- CO3: Identify appropriate data mining algorithms to solve real world problems
- CO4: Compare and evaluate different data mining techniques like classification, prediction, clustering and association rule mining
- CO5: Choose an appropriate method to perform exploratory analysis.
- CO6: Interpret results by carrying out data visualization and formal inference procedures

##### **BCA 353: DSE III (Principles of Operating Systems):**

After successful completion of this course, students will be able to:

- CO1: Describe algorithms for process, memory, and disk scheduling
- CO2: Apply technique for inter-process communication and Multithreading.
- CO3: Implement concept of critical-section
- CO4: Compare and contrast deadlock avoidance and prevention.

CO5: Use functions for file system management

**BCA354: Artificial Intelligence:**

After successful completion of this course, students will be able to:

CO1: Apply the suitable algorithms to solve AI problems

CO2: Identify and apply suitable Intelligent agents for various AI applications

CO3: Build smart system using different informed search / uninformed search or heuristic approaches

CO4: Represent complex problems with expressive language of representation

**BCA355: SEC II (Cloud Computing):**

After successful completion of this course, students will be able to:

CO1: Explain the core issues in cloud computing such as security, privacy, and interoperability.

CO2: Choose the appropriate technologies, algorithms, and approaches for the given application.

CO3: Compare and contrast various cloud services

**BCA356: DSE I Laboratory (Programming in JAVA):**

After successful completion of this course, students will be able to:

CO1: Identify classes, objects, class members and relationships for a given problem.

CO2: Design end to end applications using object-oriented constructs.

CO3: Apply collection classes for storing java objects.

CO4: Use Java APIs for program development.

CO5: Handle abnormal termination of a program using exception handling

**BCA357: DSE II Laboratory (Data mining):**

After successful completion of this course, students will be able to:

CO1: Implement data mining tasks using R

CO2: Use the python packages to carry out data mining tasks.

CO3: Perform data analysis and data visualization using python packages.

**BCA 358: DSE III Laboratory (Operating Systems and AI) :**

After successful completion of this course, students will be able to:

- CO1: Implement algorithms for Process scheduling and Memory management
- CO2: Describe process synchronization and multithreading
- CO3: Compare and contrast the algorithms for memory management and its allocation policies.
- CO4: Use searching algorithms
- CO5: Design a simple Expert system

**T. Y. BCA(Science) SEMESTER VI****BCA 361: Android Programming:**

After successful completion of this course, students will be able to:

- CO1: Describe the process of developing mobile applications.
- CO2: Create mobile applications on the Android Platform.
- CO3: Design and implement mobile applications involving data storage in SQLite database.
- CO4: Use location-based services while developing applications

**BCA 362: DSE-V Programming in Go:**

After successful completion of this course, students will be able to:

- CO1: Describe the core features and concepts in Go
- CO2: Write simple Go programs using functions
- CO3: Apply defining methods and Go Interfaces
- CO4: Use Goroutines and Channels
- CO5: Explore Go Packages

**BCA 363: DSE VI Software Project Management:**

After successful completion of this course, students will be able to:

- CO1: Comprehend Software Project Management Concepts
- CO2: Use various tools for Software Project Management Schedule various activities in software projects
- CO3: Track a project and manage changes
- CO4: Apply Agile Project Management concepts
- CO5: Analyze staffing process for team building and decision making

**BCA364: SEC III Management Information System:**

After successful completion of this course, students will be able to:

CO1: Describe MIS, BPR, EMS

CO2: Compare MIS with BPR, DSS and EMS

CO3: Identify various ERP modules for a given application

CO4: List the applications of MIS in Manufacturing and service sectors

**BCA365: SEC IV Internet of Things (IoT):**

After successful completion of this course, students will be able to:

CO1: Define Embedded Systems and the Internet of Things

CO2: Apply enabling technologies for developing IoT systems

CO3: Design simple IoT applications Analyze protocols for communication among IoT devices

CO4: Describe cloud-based IoT systems Comprehend security issues in IoT applications

**BCA366: DSE IV Laboratory (Android Programming):**

After successful completion of this course, students will be able to:

CO1: Describe the process of developing mobile applications.

CO2: Create mobile applications on the Android Platform.

CO3: Design and implement mobile applications involving data storage in SQLite database

CO4: Use location-based services while developing applications

**BCA367: DSE V Laboratory (Programming in GO and IoT):**

After successful completion of this course, students will be able to:

CO1: Write programs using features supported in GO

CO2: Handle errors and utilize Goroutines and Channels

CO3: Write programs on File handling

CO4: Compare and contrast features of GO with another object oriented languages

CO5: Design Simple IoT application

**BCA368: DSE VI Project Laboratory:**

After successful completion of this course, students will be able to:

CO1: Demonstrate a sound technical knowledge of selected project topic.

CO2: Apply techniques for project management

CO3: Create various documents used during the development of the project

and a project report