T. JOHN COLLEGE

NAAC Accredited with 'A" Grade
Recognised by UGC under sections 2(f) and 12(b) & Affiliated to Bangalore University

**BCA**

## PROGRAM OUTCOMES

PO 1: An ability to improve not only comprehensive understanding of the theory but its application too in various fields.

PO 2: The program prepares the young professional for a range of innovative computer technologies.

PO 3: In order to enhance programming skills of the young IT professionals, the program has introduced the concept of project development in each language/technology learnt during semester.

PO 4: After completing BCA, a student can go for MCA which is a masters in computer application and is considered equivalent to engineering course (B. Tech).

PO 5: Students will be able to recognize & appreciate the role of computing in a wide diversity of activities & application of Modern society, including commerce, education and communication.

## PROGRAM SPECIFIC OUTCOMES

PSO 1. Prepare themselves to employable arena of computer applications.
PSO 2. Pursue higher studies in the area of Computer Science and Computer Applications.
PSO 3. Take up self-employment in Indian & global software market.
PSO 3. Meet the supplies of the Industrial standards.

## COURSE OUTCOMES

CO 1. Analyze a given problem and develop an algorithm to solve the problem

C0 2. Develop the software projects or prototypes by understanding the requirements.

CO3. Analyse a given problem and implement an algorithm to solve the problem

CO4. To understand the services provided by and the design of an operating system.

CO5. Analyse data structure influence on algorithms, program design and program performance

CO6. Understand and apply database normalization Concepts




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## Programme Name: Bachelor of Computer Applications

| **Paper Code:** BCA103T<br>**Core paper 1:** Problem Solving Techniques using C | | | |
|---|---|---|---|
| **Semester**<br>**I** | **Hours / Week**<br>**4** | **Total hours**<br>**60** | **Credits** |

**Course Objectives**

1. To impart adequate knowledge on the need of programming languages and problem solving techniques.
2. To develop an in-depth understanding of functional and logical concepts of C Programming.
3. To provide exposure to problem-solving through C programming.
4. To familiarize the basic syntax and semantics of C Language

**Course Outcomes**

CO1: Describe the basics of computer and understand the problem solving aspect.
Co2: Demonstrate the algorithm and flow chart for the given problem.
CO3: Design and develop C program to evaluate simple expressions and logical operations.
CO4: Develop & Implement C programs with suitable modules to solve the given problem.
CO5: Demonstrate the concept of pointer and perform I/O operations in files.
CO6: Design and develop solutions to real world problems using C.

| **Paper Code:** BCA104T<br>**Core paper 2:** Digital Electronics | | | |
|---|---|---|---|
| **Semester**<br>**I** | **Hours / Week**<br>**4** | **Total hours**<br>**60** | **Credits** |

**Course Objectives:**

1. To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.
2. To impart how to design Digital Circuits.

**Course Outcomes**

CO1: Express basic concepts and logic circuits.
CO2: Convert different type of codes and number systems which are used in digital communication and computer systems.
CO3: Employ the codes and number systems converting circuits and Compare different types of logic families which are the basic unit of different types of logic gates in the domain of economy, performance and efficiency.
CO4: Explains number systems and convert number systems.
CO5: Explains logical AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR functions.
CO6: Demonstrates the simplification of logical statements.

**Paper Code:** BCA105T
**Core paper 3:** Discrete Mathematics

| Semester | Hours / Week | Total hours | Credits |
|---|---|---|---|
| I | 5 | 65 | |

**Course Objectives:**

1. Use logical notation and perform logical proofs
2. Determine equivalent logic expressions
3. Use graphs and trees
4. Apply basic and advanced principles of counting
5. Define sets and sequences
6. Calculate discrete probabilities.

**Course Outcomes**

CO1: Identify sets, different properties of sets, set operations and set identities.
CO2: Explain the different methods for representing the relationship between sets.
CO3: The basic concepts involving functions needed in discrete mathematics.
CO4: Discuss how the equivalence classes of an equivalence relation partition a set into disjoint nonempty subsets.
CO5: Use logical notation and perform logical proofs.

**Paper Code:** BCA103P
**Core Lab paper 1:** C Programming Lab

| Semester | Hours / Week | Total hours | Credits |
|---|---|---|---|

| | | | |
|---|---|---|---|
| **I** | **3** | **36** | |

**Course Objectives:**

1. To impart adequate knowledge on the need of programming languages and problem solving techniques.
2. To develop an in-depth understanding of functional and logical concepts of C Programming.
3. To provide exposure to problem-solving through C programming.
4. To familiarize the basic syntax and semantics of C Language

**Course Outcomes:**

CO1: Develop programming skills using the fundamentals and basics of C Language.
CO2: Develop programs using the basic elements like control statements, Arrays and Strings
CO3: Enable effective usage of arrays, structures, functions and pointers.
CO4: Implement files and command line arguments.

**Paper Code:** BCA104P
**Core Lab paper 2:** Digital Electronics Lab

| **Semester** | **Hours / Week** | **Total hours** | **Credits** |
|---|---|---|---|
| **I** | **3** | **36** | |

**Course Objectives:**

1. To know the concepts of combinational circuits
2. To understand the concept of flip flops, registers and counters.

**Course Outcomes**

CO1: Learn the basic gates
CO2: Construct the combinational circuits and verify their functionalities
CO3: Apply the design procedures to design the sequential circuits
CO4: Learn about counter and shift registers

**Paper Code:** BCA203T
**Core paper 4:** Data structures

| **Semester** | **Hours / Week** | **Total hours** | **Credits** |
|---|---|---|---|
| **II** | **4** | **60** | |

**Course Objectives:**

1. To educate the concepts of fundamentals of writing algorithms and approach in problem solving.
2. To represent the basic concepts of stack, queue, linked list, trees and graphs.
3. To understand the concepts of searching and sorting techniques.

**Course Outcomes:**

CO1: Remember the concepts of algorithms for searching, sorting and dynamic programming.
CO2: Understand the representations of data and various algorithm
CO3: Apply appropriate algorithms and data structures for real time applications.
CO4: Analyze the complexity of different algorithms

| **Paper Code:** BCA204T<br>**Core paper 5:** Database Management Systems | | | |
|---|---|---|---|
| **Semester**<br>**II** | **Hours / Week**<br>**4** | **Total hours**<br>**60** | **Credits** |

**Course Objectives**

1. To grasp the different issues involved in the design of a database system.
2. To study the physical and logical database designs and database modeling like relational, hierarchical, and network models.
3. To understand essential DBMS concepts such as: database security, integrity and normalization.
4. To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling and designing a DBMS.

**Course Outcomes:**

CO1: Define data independence, data models for database systems, database schema and database instances.
CO2: Understand and use data manipulation language to query and manage a database.
CO3: Analyze and design a real database application.
CO4: Apply normalization concepts for designing a good database with integrity constraints.

| **Paper Code:** BCA203P<br>**Core Lab paper 3:** Data Structures Lab | | | |
|---|---|---|---|
| **Semester**<br>**II** | **Hours / Week**<br>**3** | **Total hours**<br>**36** | **Credits** |

**Course Objectives**

1. To develop skills to design and analyze simple linear and non linear data structures.
2. It strengthen the ability to the students to identify and apply the suitable data structure for the given real world problem.
3. It enables them to gain knowledge in practical applications of data structures.

**Course Outcomes:**

CO1: Be able to design and analyze the time and space efficiency of the data structure

CO2: Be capable to identity the appropriate data structure for given problem
CO3: Have practical knowledge on the applications of data structures

| **Paper Code:** BCA204P<br>**Core Lab paper 4:** DBMS Lab | | | |
|---|---|---|---|
| **Semester**<br>**II** | **Hours / Week**<br>**3** | **Total hours**<br>**36** | **Credits** |

**Course Objectives:**

1. To understand the practical applicability of database management system concepts.
2. Working on existing database systems, designing of database, creating relational database, analysis of table design.

**Course Outcomes:**

**CO1:** Students get practical knowledge on designing and creating relational database systems.
CO2: Understand various advanced queries execution such as relational constraints, joins, set operations, aggregate functions, trigger views and embedded SQL.
CO3: Use of various software to design and build ER Diagrams, UML, Flow chart for related database systems.
CO4: Students will be able to design and implement database applications on their own

| **Paper Code:** BCA303T<br>**Core paper 6:** Object Oriented Programming using C++ | | | |
|---|---|---|---|
| **Semester**<br>**III** | **Hours / Week**<br>**4** | **Total hours**<br>**60** | **Credits** |

**Course Objectives:**

1. To develop a greater understanding of the issues involved in programming language design and object oriented paradigms and its implementation.
2. To impart adequate knowledge on the need of object oriented programming languages.
3. To enhance problem solving and programming skills in C++ by implementing the object oriented concepts.

**Course Outcomes:**

CO1: Remember the characteristics of Procedure and Object Oriented Programming Languages
CO2: Understand the fundamentals of C++ programming structure, function overloading and constructors.
CO3: To be able to program using C++ features such as composition of objects, Operator overloading, inheritance, Polymorphism etc.

CO4: Apply the concepts in object oriented programming in terms of software reuse and managing complexity to solve real-world problems.

| **Paper Code:** BCA305T<br>**Core paper 7:** Operating System | | | |
|---|---|---|---|
| **Semester**<br>**III** | **Hours / Week**<br>**5** | **Total hours**<br>**65** | **Credits** |

**Course Objectives:**

1. Students will gain knowledge of basic operating system concepts.
2. To have an in-depth understanding of process concepts, deadlock and memory management.
3. To provide an exposure to scheduling algorithms, devices and information management.
4. Students will familiarize on the general structure of an operating system and case study is also provided.

**Course Outcomes:**

**CO1:** Remember the basic concepts of operating system
CO2: Understand the concepts like interrupts, deadlock, and memory management and file management.
CO3: Analyze the need for scheduling algorithms.
CO4: Implement different algorithms used for representation, scheduling, allocation in DOS and UNIX operating system.

| **Paper Code:** BCA303P<br>**Core paper 5:** C++ Lab | | | |
|---|---|---|---|
| **Semester**<br>**III** | **Hours / Week**<br>**3** | **Total hours**<br>**36** | **Credits** |

**Course Objectives:**

1. To familiarize the students with language environment and to develop the programs for solving the problems using function overloading, constructors and object.
2. This course provides methods and technologies involved in building complex software. It also introduces concepts that includes various steps involved in developing software including requirement elicitation, system design, object design and testing.

**Course Outcomes**

CO1: Implement the concepts of object oriented programming
CO2: Apply string functions to perform operator overloading,

CO3: Demonstrate virtual functions and inheritance.
CO4: Implement files and command line arguments.

| **Paper Code:** BCA403T<br>**Core paper 8:** Visual Programming | | | |
|---|---|---|---|
| **Semester**<br>**IV** | **Hours / Week**<br>**4** | **Total hours**<br>**60** | **Credits** |

**Course Objective**

1. The main aim of the course is to cover visual basic and oracle programming skills required for modern software development.
2. To study the advantages of Controls available with visual basic.
3. To gain a *basic* understanding of database access and management using data controls.
4. To facilitate the learner to carry out project works using the tools available in VB

**Course Outcomes:**

CO1: Demonstrate fundamental skills in utilizing the tools of a visual environment such as command, menus and toolbars.
CO2: Implement SDI and MDI applications using forms, dialogs, and other types of GUI components.
CO3: Understand the connectivity between VB with MS-ACCESS, ORACLE and SQL and SQL database
CO4: Implement the methods and techniques to develop projects.

| **Paper Code:** BCA404T<br>**Core paper 9:** Unix Shell programming | | | |
|---|---|---|---|
| **Semester**<br>**IV** | **Hours / Week**<br>**4** | **Total hours**<br>**60** | **Credits** |

**Course Objective**

1. To Identify and use UNIX/Linux utilities to create and manage simple file processing operations
2. To organize directory structures with appropriate security
3. To develop shell scripts to perform more complex tasks.

**Course Outcomes:**

CO1: Monitor system performance and network activities.
CO2: Effectively use software development tools including libraries, preprocessors, compilers, linkers, and make files.
CO3: Comprehend technical documentation, prepare simple readable user documentation and adhere to style guidelines.
CO4: Collaborate in teams on system tasks.

| **Paper Code:** BCA405T<br>**Core paper 10:** Operation Research | | | |
|---|---|---|---|
| **Semester**<br>**IV** | **Hours / Week**<br>**5** | **Total hours**<br>**65** | **Credits** |

**Course Objectives:**

1. To impart knowledge in concepts and tools of Operations Research
2. To understand mathematical models used in Operations Research
3. To apply these techniques constructively to make effective business decisions

**Course Outcomes;**

CO1: Solve Linear Programming Problems
CO2: Solve Transportation and Assignment Problems
CO3: Understand the usage of game theory and Simulation for Solving Business Problems

| **Paper Code:** BCA403P<br>**Core Lab paper 6:** Visual Programming Lab | | | |
|---|---|---|---|
| **Semester**<br>**IV** | **Hours / Week**<br>**3** | **Total hours**<br>**36** | **Credits** |

**Course Objectives**

1. To develop applications using Graphical User Interface tools.
2. To understand the design concepts.
3. To design and build database systems and demonstrate their competence.

**Course Outcomes:**

CO1: Understand the concepts of Visual Basic
CO2: Learn the advantages of Controls in VB
CO3: Design and develop the event- driven applications using Visual Basic framework.
CO4: Apply the knowledge of database methods.

| **Paper Code:** BCA404P<br>**Core paper 7:** UNIX Lab | | | |
|---|---|---|---|
| **Semester**<br>**IV** | **Hours / Week**<br>**3** | **Total hours**<br>**36** | **Credits** |

**Course Objectives:**

1. Basic understanding of UNIX OS, UNIX commands and File system
2. To familiarize students with the Linux environment.
3. To make student learn fundamentals of shell scripting and shell programming.
4. Emphases are on making student familiar with UNIX environment and issues related to it.

**Course Outcomes:**

CO1: To execute the various UNIX commands on a standard UNIX/LINUX Operating system
CO2: Able to do shell programming on UNIX OS.
CO3: Able to understand and handle UNIX system calls.

**Paper Code:** BCA501T
**Core paper 11:** Data Communication and Networks

| Semester | Hours / Week | Total hours | Credits |
|---|---|---|---|
| V | 4 | 60 | |

**Course Objectives:**

1. To educate the concepts of terminology and concepts of the OSI reference model and the TCP/IP reference model and protocols such as TCP, UDP and IP.
2. To be familiar with the concepts of protocols, network interfaces, and esign/performance issues in local area networks and wide area networks.
3. Introduce the student to a network routing for IP networks and how a collision occurs and how to solve it and how a frame is created and character count of each frame.

**Course Outcomes:**

CO1: Remember the organization of computer networks, factors influencing computer network development and the reasons for having variety of different types of networks.
CO2: Understand Internet structure and can see how standard problems are solved and the use of cryptography and network security
CO3: Apply knowledge of different techniques of error detection and correction to detect and solve error bit during data transmission.
CO4: Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies.

**Paper Code:** BCA502T
**Core paper 12:** Software Engineering

| Semester | Hours / Week | Total hours | Credits |
|---|---|---|---|
| V | 4 | 60 | |

**Course Objectives**

1. To understand the overview of Software Project Characteristics and software management.
2. To familiarize with the different methods and techniques used in project management.
3. To understand and reduce the failure issues of software projects.
4. To learn how effectively the project scheduling, risk analysis, quality management and project cost estimation can be implemented using various techniques.

**Course Outcomes:**

CO1: Analyze the fundamentals of project management and compare different software engineering process models

CO2: Understand various concepts involved in project management, project planning and project scheduling.

CO3: Analyze project risks, monitor and track project deadlines and produce a work plan and resource schedule.

CO4: Apply the project management tools and techniques in a diversity of fields that include new product and process development, construction, information technology, and applied research.

**Paper Code:** BCA503T
**Core paper 13:** Computer Architecture

| **Semester** | **Hours / Week** | **Total hours** | **Credits** |
|---|---|---|---|
| **V** | **4** | **60** | |

**Course Objective**

1. To educate the basics of computer hardware and how software interacts with computer hardware.
2. To familiarize with different numbering methods like binary, octal, and hexadecimal.
3. To impart the knowledge of buses, I/O devices, flip flops, Memory and bus structure.
4. To understand the concepts of memory hierarchy and compare different methods for computer architecture.

**Course Outcomes:**

**CO1:** Remember basic structure of computer and numbering methods like binary, octal and hexadecimal and explain how arithmetic and logical operations are performed by computers.

CO2: Understand various data transfer techniques in digital computer and control unit operations.

CO3: Apply performance issues in processor and memory design of a digital computer various data representations.

CO4: Analyze architectures and computational designs and computer architecture concepts related to design of modern processors, memories and I/Os.

**Paper Code:** BCA504T
**Core paper 14:** Object Oriented Programming using Java

| **Semester** | **Hours / Week** | **Total hours** | **Credits** |
|---|---|---|---|
| **V** | **4** | **60** | |

**Course Objectives:**

1. Gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc.
2. Understand the fundamentals of object-oriented programming in Java, including managing classes, objects, invoking methods etc and exception handling mechanisms.
3. Concepts of inheritance, packages, interfaces and multithreading are introduced.

**Course Outcomes:**

CO1: Remember the fundamentals of programming such as variables, conditional statements and iterative execution statements.
CO2: Understand the concepts of arrays, strings, packages and multithreading.
CO3: Analyze the concepts of applet programming, graphics programming and files.
CO4: Create a software application using the Java programming language

**Paper Code:** BCA505T
**Core paper 15:** Microprocessor and Assembly Language

| **Semester** | **Hours / Week** | **Total hours** | **Credits** |
|---|---|---|---|
| **V** | **4** | **60** | |

**Course Objective:**

1. To understand the design of the various functional units of digital computers.
2. To understand basic architecture of 16 bit and 32 bit microprocessors with block diagrams and pins and signals.
3. To make the students to estimate the required hardware and software resources for an electronic systems.
4. To discuss about the various types of storage systems and port systems.
5. To discuss about the various components of motherboard, serial port and parallel port.

**Course Outcomes;**

CO1**:** Familiar with the functionality of the various components of a system.
CO2: To understand basic architecture of 16 bit and 32 bit microprocessors with block diagrams and pins and signals.
CO3: To make the students to estimate the required hardware and software resources for an electronic system.
CO4: To discuss about the various types of storage systems and port systems.
CO5: To discuss about the various components of motherboard, serial port and parallel port.

| **Paper Code:** BCA504P<br>**Core Lab paper 8:** Java Programming Lab | | | |
|---|---|---|---|
| **Semester**<br>**V** | **Hours / Week**<br>**3** | **Total hours**<br>**36** | **Credits** |

**Course Objective:**

1. This course introduces computer programming using the JAVA programming language with object-oriented programming principles.
2. Emphasis is placed on event-driven programming methods, including creating and manipulating objects, classes, graphics concepts, applet programming concepts etc.,
3. Upon completion, students should be able to design, code and debug JAVA language programs.

**Course Outcomes**

CO1: Remember the fundamentals of Java programming language
CO2: Understand the basics of Java programming, multi-threaded programs and Exception handling
CO3: Analyze and use Java in a variety of applications.
CO4: Write and debug a software application developed using the Java programming language.

| **Paper Code:** BCA505P<br>**Core Lab paper 9:** Assembly language and Programming Lab | | | |
|---|---|---|---|
| **Semester**<br>**V** | **Hours / Week**<br>**3** | **Total hours**<br>**36** | **Credits** |

**Course Objective:**

1. Outline the history of computing devices.
2. Describe the architecture of 8086 microprocessors.
3. Develop programs for microprocessor and microcontrollers
4. Compare microprocessors and microcontrollers
5. Understand 8051 microcontroller concepts, architecture and programming

**Course Outcomes:**

**CO1:** Draw timing diagram
CO2: Interface peripherals to 8086 and 8051
CO3: Evaluate the appropriateness of a memory expansion interface based on the address reference with particular application.

| **Paper Code:** BCA601T<br>**Core paper 16:** Theory of Computation | | | |
|---|---|---|---|
| **Semester**<br>**VI** | **Hours / Week**<br>**4** | **Total hours**<br>**60** | **Credits** |

**Course Objectives:**

1. To give an overview of the theoretical foundations of computer science from the perspective of formal languages
2. To illustrate finite state machines to solve problems in computing
3. To explain the hierarchy of problems arising in the computer sciences.
4. To familiarize Regular grammars, context frees grammar.

**Course Outcomes:**

CO1: To use basic concepts of formal languages of finite automata techniques
CO2: To Design Finite Automata's for different Regular Expressions and Languages
CO3: To Construct context free grammar for various languages
CO4: To solve various problems of applying normal form techniques, push down automata and turing Machines
CO5: To participate in GATE, PGECET and other competitive examinations

| **Paper Code:** BCA602T<br>**Core paper 17:** System Programming | | | |
|---|---|---|---|
| **Semester**<br>**VI** | **Hours / Week**<br>**4** | **Total hours**<br>**60** | **Credits** |

**Course Objective**

1. To comprehend the processing of programs on a computer system.
2. To understand the design and implementation of language processor.
3. To enhance the ability of program generation through expansion.
4. To gain knowledge about Code optimization and software tools.

**Course Outcomes:**

CO1: Know the program generation and program execution activities in detail.
CO2: Understand the concepts of Macro Expansions.
CO3: Gain the knowledge of editing processes.
CO4: Apply appropriate software tools for program development.

| **Paper Code:** BCA603T<br>**Core paper 18:** Cryptography and Network Security | | | |
|---|---|---|---|
| **Semester**<br>**VI** | **Hours / Week**<br>**4** | **Total hours**<br>**60** | **Credits** |

**Course Objectives**

1. To understand te basics of Cryptography and network security
2. To be able to secure a message over insecure channel by various means
3. To learn about how to maintain the confidentiality, integrity and availability of data
4. To understand various protocols for network security to protect against the thrats in the networks.

**Course Outcomes:**

CO1: Provide the security of the data over the network
CO2: Do research in the emerging areas of cryptography and network security
CO3: Implement various networking protocols
CO4: Protect any network from the threats in the world
CO5: Understand Internet structure and can see how standard problems are solved and the use of cryptography and network security

| **Paper Code:** BCA604T<br>**Core paper 19:** Web Programming | | | |
|---|---|---|---|
| **Semester**<br>**VI** | **Hours / Week**<br>**4** | **Total hours**<br>**60** | **Credits** |

**Course Objectives**

1. The course introduces the basic concepts of the World Wide Web, principles and tools that are used to develop Web applications.
2. To develop an ability to design and implement static and dynamic website.
3. Design and develop a Web site using text, images, links, lists, and tables for navigation and layout.

**Course Outcomes:**

CO1: Remember the internet related concepts that are vital in understanding web development.
CO2: Understand the important HTML tags for designing static pages
CO3: Design and develop web pages using internal or external linking
CO4: Develop interactive web applications through coding using HTML

**Paper Code:** BCA604P
**Core Lab paper 10:** Web Programming Lab

| Semester | Hours / Week | Total hours | Credits |
|---|---|---|---|
| VI | 3 | 36 | |

**Course Objectives**

1. To develop the proficiency in implementing various programming concepts using Scripting Languages like JavaScript, VBScript, and ASP in the workings of the web and web applications
2. To familiarize how JavaScript programs are used in a web page including the use of event-handlers and the Document Object Model.
3. To understand and practice embedded dynamic scripting on client side Internet Programming.
4. Students gain the skills and project-based experience needed for entry into web design and development careers.

**Course Outcomes:**

CO1: Remember client-Side Programming, Server-Side Programming, Active Server Pages, and database Connectivity to web applications
CO2: Understand difference between client side web technologies and server side web technologies
CO3: Apply role of languages like HTML, JavaScript, VBScript, ASP and protocols in the workings of the web and web applications
CO4: Analyze a web project and identify its elements and attributes in comparison to traditional projects and build customize web sites and web applications

**Paper Code:** BCA605P
**Core Lab paper 11:** Project

| Semester | Hours / Week | Total hours | Credits |
|---|---|---|---|
| VI | 16 | | |

**Course Objectives**

1. To understand and select the task based on their core skills.
2. To get the knowledge about analytical skill for solving the selected task.
3. To get confidence for implementing the task and solving the real time problems.

**Course Outcomes:**

CO1: Identify and formulate the problem
CO2: Analyse the problem and collect necessary data.
CO3: Design and develop the project using appropriate software by applying the programming skills.
CO4: Implement, evaluate and generate reports.

## NEP BASED SYLLABUS
## (2021 – 22)

| **Paper Code:** CA-C1T<br>**Core paper 1:** Discrete Mathematics | | | |
|---|---|---|---|
| **Semester**<br>I | **Hours / Week**<br>3 | **Total hours**<br>48 | **Credits**<br>3 |

**Course Objectives:**

1. Use logical notation and perform logical proofs
2. Determine equivalent logic expressions
3. Use graphs and trees
4. Apply basic and advanced principles of counting
5. Define sets and sequences
6. Calculate discrete probabilities.

**Course Outcomes**

CO1: Identify sets, different properties of sets, set operations and set identities.
CO2: Explain the different methods for representing the relationship between sets.
CO3: The basic concepts involving functions needed in discrete mathematics.
CO4: Discuss how the equivalence classes of an equivalence relation partition a set into disjoint nonempty subsets.
CO5: Use logical notation and perform logical proofs.

| **Paper Code:** CA-C2T<br>**Core paper 2:** Problem Solving Techniques | | | |
|---|---|---|---|
| **Semester**<br>**I** | **Hours / Week**<br>**3** | **Total hours**<br>**48** | **Credits**<br>**3** |

**Course Objectives**

1. To impart adequate knowledge on the need of programming languages and problem solving techniques.
2. To develop an in-depth understanding of functional and logical concepts of C Programming.
3. To provide exposure to problem-solving through C programming.
4. To familiarize the basic syntax and semantics of C Language

**Course Outcomes**

CO1: Describe the basics of computer and understand the problem solving aspect.
Co2: Demonstrate the algorithm and flow chart for the given problem.
CO3: Design and develop C program to evaluate simple expressions and logical operations.
CO4: Develop & Implement C programs with suitable modules to solve the given problem.
CO5: Demonstrate the concept of pointer and perform I/O operations in files.
CO6: Design and develop solutions to real world problems using C.

| **Paper Code:** CA-C3T<br>**Core paper 2:** Data Structures | | | |
|---|---|---|---|
| **Semester**<br>**I** | **Hours / Week**<br>**3** | **Total hours**<br>**48** | **Credits**<br>**3** |

**Course Objectives:**

1. To educate the concepts of fundamentals of writing algorithms and approach in problem solving.
2. To represent the basic concepts of stack, queue, linked list, trees and graphs.
3. To understand the concepts of searching and sorting techniques.

**Course Outcomes:**

CO1: Remember the concepts of algorithms for searching, sorting and dynamic programming.
CO2: Understand the representations of data and various algorithm
CO3: Apply appropriate algorithms and data structures for real time applications.
CO4: Analyze the complexity of different algorithms

| **Paper Code:** CA-C4L<br>**Core Lab paper 1:** C Programming lab | | | |
|---|---|---|---|
| **Semester**<br>**I** | **Hours / Week**<br>**3** | **Total hours**<br>**48** | **Credits**<br>**2** |

**Course Objectives:**

1. To impart adequate knowledge on the need of programming languages and problem solving techniques.
2. To develop an in-depth understanding of functional and logical concepts of C Programming.
3. To provide exposure to problem-solving through C programming.
4. To familiarize the basic syntax and semantics of C Language

**Course Outcomes:**

CO1: Develop programming skills using the fundamentals and basics of C Language.
CO2: Develop programs using the basic elements like control statements, Arrays and Strings
CO3: Enable effective usage of arrays, structures, functions and pointers.
CO4: Implement files and command line arguments.

| **Paper Code:** CA-C5L<br>**Core Lab paper 2:** Data Structure lab | | | |
|---|---|---|---|
| **Semester**<br>**I** | **Hours / Week**<br>**3** | **Total hours**<br>**48** | **Credits**<br>**2** |

**Course Objectives**

1. To develop skills to design and analyze simple linear and non linear data structures.
2. It strengthen the ability to the students to identify and apply the suitable data structure for the given real world problem.
3. It enables them to gain knowledge in practical applications of data structures.

**Course Outcomes:**

CO1: Be able to design and analyze the time and space efficiency of the data structure
CO2: Be capable to identity the appropriate data structure for given problem
CO3: Have practical knowledge on the applications of data structures

**Paper Code:** CA-C6T
**Core paper 3:** Computer Architecture

| Semester | Hours / Week | Total hours | Credits |
|---|---|---|---|
| **II** | **3** | **48** | **3** |

**Course Objective**

1. To educate the basics of computer hardware and how software interacts with computer hardware.
2. To familiarize with different numbering methods like binary, octal, and hexadecimal.
3. To impart the knowledge of buses, I/O devices, flip flops, Memory and bus structure.
4. To understand the concepts of memory hierarchy and compare different methods for computer architecture.

**Course Outcomes:**

**CO1:** Remember basic structure of computer and numbering methods like binary, octal and hexadecimal and explain how arithmetic and logical operations are performed by computers.
CO2: Understand various data transfer techniques in digital computer and control unit operations.
CO3: Apply performance issues in processor and memory design of a digital computer various data representations.
CO4: Analyze architectures and computational designs and computer architecture concepts related to design of modern processors, memories and I/Os.

**Paper Code:** CA-C7T
**Core paper 4:** Object Oriented Programming using Java

| Semester | Hours / Week | Total hours | Credits |
|---|---|---|---|
| **II** | **3** | **48** | **3** |

**Course Objectives:**

1. Gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc.
2. Understand the fundamentals of object-oriented programming in Java, including managing classes, objects, invoking methods etc and exception handling mechanisms.
3. Concepts of inheritance, packages, interfaces and multithreading are introduced.

**Course Outcomes:**

CO1: Remember the fundamentals of programming such as variables, conditional statements and iterative execution statements.
CO2: Understand the concepts of arrays, strings, packages and multithreading.
CO3: Analyze the concepts of applet programming, graphics programming and files.
CO4: Create a software application using the Java programming language

**Paper Code:** CA-C8T
**Core paper 5:** Database Management System

| Semester | Hours / Week | Total hours | Credits |
|---|---|---|---|
| **II** | **3** | **48** | **3** |

**Course Objectives**

1. To grasp the different issues involved in the design of a database system.
2. To study the physical and logical database designs and database modeling like relational, hierarchical, and network models.
3. To understand essential DBMS concepts such as: database security, integrity and normalization.
4. To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling and designing a DBMS.

**Course Outcomes:**

CO1: Define data independence, data models for database systems, database schema and database instances.
CO2: Understand and use data manipulation language to query and manage a database.
CO3: Analyze and design a real database application.
CO4: Apply normalization concepts for designing a good database with integrity constraints.

| **Paper Code:** CA-C9L<br>**Core Lab paper 3:** Java Lab | | | |
|---|---|---|---|
| **Semester**<br>**II** | **Hours / Week**<br>**3** | **Total hours**<br>**48** | **Credits**<br>**2** |

**Course Objective:**

1. This course introduces computer programming using the JAVA programming language with object-oriented programming principles.
2. Emphasis is placed on event-driven programming methods, including creating and manipulating objects, classes, graphics concepts, applet programming concepts etc.,
3. Upon completion, students should be able to design, code and debug JAVA language programs.

**Course Outcomes**

CO1: Remember the fundamentals of Java programming language
CO2: Understand the basics of Java programming, multi-threaded programs and Exception handling
CO3: Analyze and use Java in a variety of applications.
CO4: Write and debug a software application developed using the Java programming language.

| **Paper Code:** CA-C10L<br>**Core lab paper 4:** Database Management Systems Lab | | | |
|---|---|---|---|
| **Semester**<br>**II** | **Hours / Week**<br>**3** | **Total hours**<br>**48** | **Credits**<br>**2** |

**Course Objectives:**

1. To understand the practical applicability of database management system concepts.
2. Working on existing database systems, designing of database, creating relational database, analysis of table design.

**Course Outcomes:**

**CO1:** Students get practical knowledge on designing and creating relational database systems.
CO2: Understand various advanced queries execution such as relational constraints, joins, set operations, aggregate functions, trigger views and embedded SQL.
CO3: Use of various software to design and build ER Diagrams, UML, Flow chart for related database systems.
CO4: Students will be able to design and implement database applications on their own