

# **BACHELOR OF COMPUTER APPLICATION (BCA)**

## **PROGRAMME OUTCOME**

At the end of the three year BCA programme the students will be able to:

- Understand, analyze and develop computer programs in the areas related to algorithm, web design and networking for efficient design of computer based system.
- Work in the IT sector as system engineer, software tester, junior programmer, web developer, system administrator, software developer etc.
- 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.

## **PROGRAM SPECIFIC OUTCOMES**

- Equip themselves to potentially rich & employable field of computer applications.
- Pursue higher studies in the area of Computer Science/Applications.
- Take up self-employment in Indian & global software market.
- Meet the requirements of the Industrial standards.

## **COURSE OUTCOMES**

### **SYLLABUS FROM 2009 ONWARD**

#### **SEMESTER I**

#### **BCA102 MATHEMATICS - I (MATRICES, CALCULUS AND LAPLACE TRANSFORMS)**

On completion of the course the student should be able to:

- Reason mathematically about basic discrete structures such as numbers, sets, used in computer science.
- Familiar with Determinant and Matrices.
- Formulate Limit, Continuity and Differentiability.
- Demonstrate a working knowledge Definite and Indefinite Integrals.

#### **BCA 102 STATISTICS**

On completion of the course the student should be able to:

- Learn about Sampling Methods.

- Know the basic idea of Permutations and Combinations, and Probability Concepts.
- Familiar with Measures of Central Tendency and Measures of Dispersion Range.
- Apply knowledge of mathematics, science, and engineering.
- Design and conduct experiments, as well as to analyze and interpret data.
- Evaluate the probabilities and conditional probabilities.
- Evaluate expectations and conditional expectations of random variables.
- Approximate the distribution of sum of random variables using CLT.
- Construct point estimators using the method of maximum likelihood.
- Calculate the number of samples needed to construct confidence levels on the mean and variance of a normal distribution.
- Use linear regression analysis to develop an empirical model of experimental data.

### **BCA 103 : DIGITAL ELECTRONICS**

Upon successful completion of the course, a student will be able to:

- Perform conversions among different number systems, become familiar with basic logic gates and understand Boolean algebra and simplify simple Boolean functions by using basic Boolean properties & design of combinational circuits such as MUX, DEMUX, Encoder and Decoder etc.
- Understand the design of sequential Circuits such as Flip-Flops, Registers, and Counters.
- Obtain a basic level of Digital Electronics knowledge and set the stage to perform the analysis and design of Complex Digital electronic Circuits

### **BCA104: FUNDAMENTALS OF PROGRAMMING WITH C**

**On completion of the course the student should be able to:**

- Analyze a given problem and develop an algorithm to solve the problem
- Improve upon a solution to a problem
- Use the 'C' language constructs in the right way

- Design, develop and test programs written in 'C'
- Use different data types in a computer program.
- Design programs involving decision structures, loops and functions.
- Understand the dynamics of memory by the use of pointers and Structures.

### **BCA 105 COMMUNICATION ENGLISH**

On completion of the course the student should be able to:

- Develop the student's ability to use English language accurately and effectively by enhancing their communication skills
- Mastering the art of a professional business presentation
- Distinguish different communication process and its practical application
- More effective written communication

### **BCA 106 DISCRETE STRUCTURE AND GRAPH THEORY**

After completion of course students are expected to be able to:

- Understand, analyze and create mathematical arguments.
- Understand sets, perform operations and algebra on sets, describe sequences and summations.
- Understand basic concepts of number theory and familiarize public and private key cryptosystems.
- Determine properties of relations, identify equivalence and partial order relations, sketch relations.

### **BCA 231 PROGRAMMING IN C-LAB**

Upon successful completion of the course, a student will be able to:

- Understand the basic terminology used in computer programming.
- Write, compile and debug programs in Language.
- Create programs involving decision structures, loops, strings and functions.
- Design programs involving structures and pointers.

### **BCA 232 DIGITAL ELECTRONICS – LAB**

- Have a thorough understanding of the fundamental concepts and techniques used in digital electronics.
- To understand and examine the structure of various number systems and its application in digital design.
- The ability to understand, analyze and design various combinational and sequential circuits.
- Ability to identify basic requirements for a design application and propose a cost effective solution.

- The ability to identify and prevent various hazards and timing problems in a digital design.
- To develop skill to build, and troubleshoot digital circuits.

## **SEMESTER II**

### **BCA 107: MATHEMATICS - II**

Upon successful completion of the course, a student will be able to:

- Master the basic set theory.
- Familiar with propositional calculus.
- Know about Graphs and algorithms.

### **BCA 108 : DATA BASE MANAGEMENT SYSTEM**

On successful completion of the course, a student will be able to:

- Gain a good understanding of the architecture and functioning of database management systems as well as associated tools and techniques, principles of data modeling using entity relationship and develop a good database design and normalization techniques to normalize a database.
- Understand the use of structured query language and its syntax, transactions, database recovery and techniques for query optimization.
- Acquire a good understanding of database systems concepts and to be in a position

### **BCA 109: COMPUTER ORGANIZATION AND ARCHITECTURE**

On successful completion of the course, a student will be able to:

- Understand the fundamentals of different instruction set architectures and their relationship to the CPU design.
- Understand the principles and the implementation of computer arithmetic.
- Learn about Primary and Secondary storage System.
- Learn about parallel computer structure and Pipelining.
- to use and design databases for different applications.

### **BCA 110 : DATA STRUCTURES**

Upon successful completion of the course, a student will be able to:

- To access how the choices of data structure & algorithm methods impact the performance of program.

- To Solve problems based upon different data structure & also write programs.
- Choose an appropriate data structure for a particular problem.

## **BCA 111: SOFTWARE ENGINEERING**

On successful completion of the course, a student will be able to:

- Select and implement different software development process models.
- Extract and analyze software requirements specifications for different projects.
- Develop some basic level of software architecture/design.
- Apply standard coding practices.
- Define the basic concepts and importance of Software project management concepts like cost estimation, scheduling and reviewing the progress.
- Identify and implement of the software metrics.
- Apply different testing and debugging techniques and analyzing their effectiveness.

## **BCA 112 : PRINCIPLES OF MANAGEMENT**

- Learners will absorb various management concepts such as planning, organizing, implementing, staffing, coordinating, controlling, motivating and Managerial Grid.
- Learners will recognize the human skills and conceptual skills as per industry requirements about basic management skills.
- Learners will diagnose various styles and qualities of Coordination, Management efficient Controlling, and leadership, Green Corporate Responsibility.

## **BCA 233 DBMS LAB**

On completion of the course, the student will be able to:

- Understand about SQL Fundamentals.
- Understand about Unary & Binary table operations.
- Understand about Handle with different Data Base languages.
- Understand about table View, Log & Triggers.
- Understand different database packages (Oracle/ mysql/ DB2/ etc) Commit& Rollback.
- Understand about handling online Transactions.
- Handle database connectivity with front-end.
- Learn about Queries Using DDL- DML commands
- Learn about Queries using AND- OR- NOT operation, Union- Intersection and Projection, Join Operation
- Learn about Sorting and Grouping
- Learn about Nested queries using SQL

- Learn about Built-in functions of SQL
- Learn about Update operations using SQL

Learn about Use of SQL forms

### **BCA 234 : DATA STRUCTURE LAB**

Upon successful completion of the course, a student will be able to:

- Know about the basic concepts of Function, Array and Link-list.
- Understand how several fundamental algorithms work particularly those concerned with Stack, Queues, Trees and various Sorting algorithms.
- Create basic C Programs and File programs.

## **SEMESTER III**

### **BCA 113: CORE JAVA**

On successful completion of the course, a student will be able to:

- Understand the principles and practice of object oriented analysis and design in the construction of robust, maintainable programs which satisfy their requirements;
- Implement, compile, test and run Java programs comprising more than one class, to address a particular software problem.
- Demonstrate the principles of object oriented programming;
- Demonstrate simple data structures like arrays in a Java program.
- Understand the concept of package, interface, multithreading and File handling in java.
- Make use of members of classes found in the Java API (such as the Math class).

### **BCA 114 : DESIGN AND ANALYSIS OF ALGORITHMS**

On successful completion of the course, a student will be able to:

- Design and analyze the time and space efficiency of the data structure
- Design an algorithm by selecting appropriate design strategies.
- Identity the appropriate data structure for given problem
- Have practical knowledge on the application of data structures
- Apply graph and tree traverse technique to various applications.
- Implement dijkstra's algorithm, binary trees, travelling Sales person Problem.

### **BCA 115: INTRODUCTION TO SYSTEM SOFTWARE**

On successful completion of the course, the student will:

- Be able to compare various system software related to the given system
- Be able to understand the concepts required to develop the system software

- Be able to make proper use of system software tools

### **BCA 116: PRINCIPLES OF PROGRAMMING LANGUAGES**

Upon successful completion, students will have the knowledge and skills to:

- Understand the role of theoretical formalisms, such as operational and denotational semantics
- Apply these semantics in the context of programming languages
- Evaluate differences (advantages/disadvantages) of these theoretical formalisms
- Create operational or denotational semantics of simple imperative programs
- Analyse the role of types in programming languages
- Formalise properties and reason about programs
- Apply basic principles for formalising concurrent programming languages

### **BCA 117 : FUNDAMENTALS OF COMPUTER NETWORKS**

On successful completion of the course, a student will be able to:

- Explain how communication works in computer networks and to understand the basic terminology of computer networks
- Explain the role of protocols in networking and to analyze the services and features of the various layers in the protocol stack.
- Understand design issues in network security and to understand security threats, security services and mechanisms to counter.

### **BCA 118: LINUX AND SHELL PROGRAMMING**

On successful completion of the course, a student will be able to:

- To know the basic concepts of Linux Operating System.
- Familiar with Linux commands.
- Understand shell programming
- Familiar with system administration

### **BCA 235 : CORE JAVA LAB**

On successful completion of the course, a student will be able to:

- Familiar with the students with OOPs concept
- create programs for various real world problems.

### **BCA 236-LINUX & SHELL PROGRAMMING**

On completion of the course, the student will be able to:

- To know the basic concepts of Linux Operating System.
- Familiar with Linux commands.

- Understand shell programming
- Familiar with system administration
- Understand various types of servers

## **SEMESTER IV**

### **BCA 119 : OPERATING SYSTEMS**

On successful completion of the course, a student will be able to:

- Learn different types of operating systems along with concept of file systems and CPU scheduling algorithms used in operating system.
- Provide students knowledge of memory management and deadlock handling algorithms.
- Implement various algorithms required for management, scheduling, allocation and communication used in Operating System.

### **BCA 120: MACHINE LEARNING TECHNIQUES**

At the end of the course, students will be able to:

- Understand different types of machine learning and map problems to different classes of machine learning algorithms.
- Describe and apply machine-learning algorithms including decision trees, naïve Bayes, and logistic regression.
- Understand subtleties and application scenarios for different supervised classification algorithms discussed above.
- Explain and apply machine-learning concepts such as regularization, overfitting, and Laplace smoothing to design efficient machine learning models.

### **BCA 121: COMPILER DESIGN**

At the end of course , the student will be able to:

- Acquire knowledge of different phases and passes of the compiler and also able to use the compiler tools like LEX, YACC, etc. Students will also be able to design different types of compiler tools to meet the requirements of the realistic constraints of compilers.
- Understand the parser and its types i.e. Top-Down and Bottom-up parsers and construction of LL, SLR, CLR, and LALR parsing table.
- Implement the compiler using syntax-directed translation method and get knowledge about the synthesized and inherited attributes.
- Acquire knowledge about run time data structure like symbol table organization and different techniques used in that.



- Understand the target machine's run time environment, its instruction set for code generation and techniques used for code optimization.

## **BCA 122: INTRODUCTION TO AI**

On successful completion of the course, a student will be able to:

- Understand the informed and uninformed problem types and apply search strategies to solve them.
- Apply difficult real life problems in a state space representation so as to solve them using AI techniques like searching and game playing.
- Design and evaluate intelligent expert models for perception and prediction from intelligent environment.
- Formulate valid solutions for problems involving uncertain inputs or outcomes by using decision making techniques.
- Demonstrate and enrich knowledge to select and apply AI tools to synthesize information and develop models within constraints of application area.
- Examine the issues involved in knowledge bases, reasoning systems and planning

## **BCA 123: OOPS USING PYTHON**

On successful completion of the course, a student will be able to:

- Create your first program in Python IDLE.
- Implement OOPs concepts in your programming.
- Use Arrays, and Data structures.
- Create an application with the support of graphics in Python.
- Implement error handling.

## **BCA 124: PRINCIPLES OF CRYPTOGRAPHY AND CYBER SECURITY**

On successful completion of the course, a student will be able to:

The student who successfully completes this course will be able to:

- Analyze and design classical encryption techniques and block ciphers.
- Understand and analyze data encryption standard.
- Understand and analyze public-key cryptography, RSA and other public-key cryptosystems such as Diffie-Hellman Key Exchange, ElGamal Cryptosystem, etc.
- Understand key management and distribution schemes and design User Authentication Protocols.
- Analyze and design hash and MAC algorithms, and digital signatures.

- Design network application security schemes, such as PGP, S/ MIME, IPSec, SSL, TLS, HTTPS, SSH, etc.
- Know about Intruders and Intruder Detection mechanisms, Types of Malicious software,
- Firewall Characteristics, Types of Firewalls, Firewall Location and Configurations.

### **BCA 237: MACHINE LEARNING LAB**

On successful completion of the course, a student will be able to:

- Understand different types of machine learning and map problems to different classes of machine learning algorithms.
- Describe and apply machine-learning algorithms including decision trees, naïve Bayes, and logistic regression.
- Understand subtleties and application scenarios for different supervised classification algorithms discussed above.
- Explain and apply machine-learning concepts such as regularization, overfitting, and Laplace smoothing to design efficient machine learning models.

### **BCA 238: PYTHON PROGRAMMING LAB**

On successful completion of the course, a student will be able to:

- Write, Test and Debug Python Programs
- Implement Conditionals and Loops for Python Programs
- Use functions and represent Compound data using Lists, Tuples and Dictionaries
- Read and write data from & to files in Python and develop Application using Pygame

## **SEMESTER V**

### **BCA 125: .Net Framework and C# Programming**

At the end of this course students will be able to

- Understand the concept of .Net Framework and C# language fundamentals.
- Evaluate C# OOPs concept and the .NET framework namespace contents.
- Develop the console and GUI applications using C# .Net
- Understanding of c# assembly, thread, app domain, serialization and Remoting concept
- Set up various navigation techniques for integrating web pages using ASP.NET Controls within the site.
- Create the dynamic web page using ASP.NET Controls which interact with databases.

- Understand working of XML with web application.

## **BCA 126: OPTIMIZATION TECHNIQUE**

On successful completion of the course, a student will be able to:

- Formulate a real-world problem as a mathematical programming model
- Understand the theoretical workings of the simplex method for linear programming and perform iterations of it by hand
- Understand the relationship between a linear program and its dual, including strong duality and complementary slackness
- Solve specialized linear programming problems like the transportation and assignment problems

## **BCA 127:COMPUTER GRAPHICS**

On completion of the course, the student will be able to:

- Provide comprehensive introduction about computer graphics system
- Design algorithms to generate the basic primitives
- Understand 2d transformations.
- Familiar with techniques of clipping, three dimensional graphics and three dimensional transformations.
- Familiar with animations

## **BCA 128 : FUNDAMENTALS OF DATA SCIENCE**

On successful completion of the course, a student will be able to:

- Students will become proficient in the statistical analysis of data and the use of computation tools for data analysis.
- Students will apply statistical and computational tools to applied problems, and clearly communicate the results in both written reports and oral presentations.