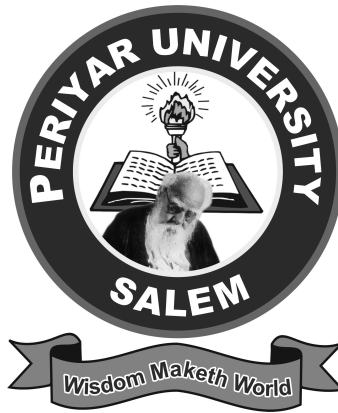


**PERIYAR UNIVERSITY**  
**SALEM – 636 011**

***PERIYAR INSTITUTE OF DISTANCE EDUCATION (PRIDE)***



**B.C.A. ( COMPUTER APPLICATIONS )**  
**[SEMESTER PATTERN]**

**REGULATIONS AND SYLLABUS**

**(Effective from the 2020 onwards)**

## BACHELOR OF COMPUTER APPLICATIONS [B.C.A.]

### I- YEAR

#### I SEMESTER

S. No	Course Code	Course	Int. Marks	Ext. Marks	Total Marks	Credits
1.		Language-I	25	75	100	4
2.		English-I	25	75	100	4
3.		Digital Computer Fundamentals	25	75	100	4
4.		Programming Lab-I: Assembly Language Programming	25	75	100	4
		<b>Total</b>	<b>100</b>	<b>300</b>	<b>400</b>	<b>16</b>

#### II SEMESTER

S. No	Course Code	Course	Int. Marks	Ext. Marks	Total Marks	Credits
1.		Language-II	25	75	100	4
2.		English-II	25	75	100	4
3.		Programming in COBOL	25	75	100	4
4.		Programming Lab-II : Programming in COBOL	25	75	100	4
		<b>Total</b>	<b>100</b>	<b>300</b>	<b>400</b>	<b>16</b>

### II YEAR

#### III SEMESTER

S.No	Course Code	Course	Int. Marks	Ext. Marks	Total Marks	Credits
1.		System Analysis and Design	25	75	100	4
2.		Relational Database Management System	25	75	100	4
3.		Programming Language C and Data Structures	25	75	100	4
4.		Programming Lab-III: Programming in 'C' using Data Structures	25	75	100	4
		<b>Total</b>	<b>100</b>	<b>300</b>	<b>400</b>	<b>16</b>

**IV SEMESTER**

S.No	Course Code	Course	Int. Marks	Ext. Marks	Total Marks	Credits
1.		Object Oriented Programming with C++	25	75	100	4
2.		Software Engineering	25	75	100	4
3.		Analysis of Algorithms	25	75	100	4
4.		Programming Lab-IV: Programming in C++ using OOPs	25	75	100	4
		<b>Total</b>	<b>100</b>	<b>300</b>	<b>400</b>	<b>16</b>

**III-YEAR****V SEMESTER**

S. No	Course Code	Course	Int. Marks	Ext. Marks	Total Marks	Credits
1.		E – Commerce	25	75	100	4
2.		Operating System	25	75	100	4
3.		Programming in VISUAL BASIC	25	75	100	4
4.		Programming Lab-V: Programming in VISUAL BASIC	25	75	100	4
		<b>Total</b>	<b>100</b>	<b>300</b>	<b>400</b>	<b>16</b>

**VI SEMESTER**

S.No	Course Code	Course	Int. Marks	Ext. Marks	Total Marks	Credits
1.		Computer Networks	25	75	100	4
2.		Data Mining	25	75	100	4
3.		Programming in JAVA and JAVA SCRIPT	25	75	100	4
4.		Programming Lab-VI :Programming in JAVA and JAVA SCRIPT	25	75	100	4
		<b>Total</b>	<b>100</b>	<b>300</b>	<b>400</b>	<b>16</b>

## **CONDITION FOR ADMISSION :**

A Candidate who has passed Higher Secondary Examination with Mathematics or Business mathematics or Computer Science or statistics (Academic stream or Vocational stream) as one of the subjects under Higher Secondary Board Of Examination, Tamil Nadu or as per norms set by the Government of Tamil Nadu or an Examination accepted as Equivalent thereto by the Syndicate subject to such conditions as may be prescribed thereto are permitted to appear and qualify for the BCA degree examination of this university after a course of study of three academic years.

## **Examinations:**

The theory and practical examination shall be three hours duration to each paper at the end of semester. The Candidate failing in any subject(s) will be permitted to appear for each failed subject(s) in the subsequent examination.

### **(a) Passing Minimum – Theory**

The candidate shall be declared to have passed the examination if the candidate secure not less than 40 marks put together out of 100 marks (CIA + EA). Minimum 40% should be secured (30 out of 75) in EA of each theory subject.

### **(b) Passing Minimum – Practical**

The candidate shall be declared to have passed the examination if the candidate secure not less than 40 marks put together out of 100 marks (CIA + EA). Minimum 40% should be secured (30 out of 75) in EA of each Practical subject.

## **Marks Distribution and Question Paper Pattern for BCA**

### **Theory –Marks Distribution**

<b>Maximum Marks</b>	<b>: 100 Marks</b>
<b>External [EA]</b>	<b>: 75 Marks</b>
<b>Internal [CIA]</b>	<b>: 25 Marks</b>

### **Theory - Question Paper Pattern [External] (Total Marks: 75)**

PART – A (10 x 2 = 20 Marks)  
(Answer ALL questions), (Two questions from each unit)

PART – B (5 x 5 = 25 Marks)  
(Answer ALL questions) & (One question from each unit with Internal Choice)

PART – C (3 x 10 = 30 Marks)  
(Answer ANY THREE questions) & (Open Choice – 3 out of 5 questions)

### **Theory - Internal Marks Distribution (Total Marks: 25)**

Attendance	: 5 Marks
Assignment	: 5 Marks
Test	: 15 Marks

## **Practical – Marks Distribution**

Maximum Marks	: 100 Marks
External [EA]	: 75 Marks
Internal [CIA]	: 25 Marks

### **Practical - External Marks Distribution (Total Marks: 75)**

For each practical question the marks should be awarded as follows (External)

- i) Algorithm / Flowchart - 20%
- ii) Writing the program in the main answer book - 30%
- iii) Test and debug the program - 30%
- iv) Display the correct output - 20%

### **Practical Question Paper Pattern**

Student should attend two questions (either or pattern)

### **Practical - Internal Marks Distribution (Total Marks: 25)**

Record	: 10 Marks
Internal Practical examinations	: 15 Marks

## **Classification of Successful Candidates:**

Candidates who secure not less than 60% of the aggregate marks in the whole examination shall be declared to have passed the examination in First Class.

All other successful candidates shall be declared to have passed in the Second Class.

Candidates who obtain 75% of the marks in the aggregate shall be deemed to have passed the examination in First Class with Distinction provided they pass all the examinations prescribed for the course at the first appearance.

Candidates who pass all the examinations prescribed for the course in the first instance and within a period three academic years from the year of admission to the course only are eligible for University Ranking.

Programme	<b>B.C.A.</b>
Effective From	2020 - onwards
SEMESTER	I
Course	<b>Digital Computer Fundamentals</b>

**UNIT – I:**

Introduction to computers: Introduction-Types of Computers-Characteristics of Computers-Word Length-Speed-Storage-Accuracy-Versatility-Automation-Diligence.Five generations of Modern Computers: First Generation Computers-Second Generation Computers-Third Generation Computers-Fourth Generation Computers-Fifth Generation Computers. Number system: Introduction-Decimal Number System-Binary number System-Binary to decimal Conversion-Decimal to Binary Conversion-Binary Addition-Binary Subtraction-Complements-9's,10's,1's,2's - Octal Number System-Hexadecimal Number System.

**UNIT – II:**

Boolean Algebra and Gate Networks: Fundamental concepts of Boolean Algebra – Logical Multiplication - AND Gates and OR Gates - Complementation and Inverters - Evaluation of Logical Expressions - Evaluation of an Expression containing parentheses - Basic Laws of Boolean Algebra - Simplification of expressions - De Morgan's theorems - Basic Duality of Boolean Algebra - Derivation of a Boolean Expression - Interconnecting Gates-Sum of products and products of sums - Derivation of products of sums expressions - Derivation of three Input variable expression - NAND gates and NOR gates - The Map method for simplifying expressions - Sub cubes and covering - Product of sums. Expressions - Don't cares.

**UNIT - III:**

Anatomy of a Digital computer: Functions and Components of a Computer- Central Processing Unit-Control Unit-Arithmetic Logic Unit-Memory - Registers-Addresses-How the CPU and Memory Work. Memory units: Introduction- RAM - ROM - PROM - EPROM - EEPROM - Flash memory.

Input Devices–Output Devices Auxiliary storage Devices: Introduction-Magnetic Tape-Hard disk-Floppy Disk-CD-ROM-CD-R Drive-CD-RW Disks.

**UNIT – IV:**

Combinational logic adders, subtractors , decoders, encoders, multiplexer, demultiplexer – Flip flops – Registers – shift register – counters.

**UNIT – V:**

Computer design – System configuration – Computer instructions – Design of computer registers – Design of control – Computer console.

**TEXT BOOK:**

1. “Fundamentals of Computer Science and Communication Engineering”. Alexis Leon , Mathew’s Leon, ( Unit I , & III )
2. “Digital Computer Fundamentals”. Thomas C.Bartee, ( Unit II & IV )
3. “Microprocessor Architecture programming and Application with the 8085”, Ramesh Gaonkar, ( Unit III & V ).

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Programme	<b>B.C.A.</b>
Effective From	2020 - onwards
SEMESTER	I
<b>Programming Lab-I:</b>	<b>Assembly Language Programming</b>

**List of Experiments:**

1. Perform 8-bit addition using 8085 Microprocessor.
2. Perform 8-bit subtraction using 8085 Microprocessor.
3. Perform 8 bit multiplication using 8085 Microprocessor.
4. Perform 8 bit division using 8085 Microprocessor.
5. Arrange the given numbers in ascending order.
6. Find the largest number in the given set.
7. Convert HEX number to Decimal number.
8. Convert Decimal number to Binary.
9. Convert Decimal Number to BCD.
10. Perform BCD addition.



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Programme	<b>B.C.A.</b>
Effective From	2020 - onwards
SEMESTER	II
Course	<b>Programming in COBOL</b>

**UNIT – I:**

Introduction to COBOL language – Rules, conventions and definition  
COBOL divisions – Identification division, Environment division, Data  
division with editing features.

**UNIT – II:**

Procedure division – verbs for the concepts and programming  
preliminaries – OPEN, CLOSE, READ, WRITE – DATA movement verb –  
Arithmetic verbs – ADD, SUBTRACT, MULTIPLY, DIVIDE, COMPUTE.

**UNIT - III:**

Conditional and sequence control verbs – Relational condition, sign,  
class, condition – name, compound conditions and IF sentence – More about  
data division clauses – REDEFINES, renames, justified, Qualification of data  
name, SIGN, SYNCHRONIZED, CORRESPONDING option.

**UNIT – IV:**

Table handling with perform verb – Times option, until, varying –  
After option, Indexed table with indexing, SET, SEARCH verb, sorting a  
table.

**UNIT – V:**

File – Sequential and direct access file features – Simple illustrative  
programs.

**TEXT BOOK:**

1. “Programming in COBOL”, Rajaraman V., PHI, New Delhi .
2. “COBOL Programming Including MS – COBOL and COBOL– 85”

M.K.Roy, D.Ghosh Dastidar, TMH, New Delhi.

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Programme	<b>B.C.A.</b>
Effective From	2020 - onwards
SEMESTER	II
Programming Lab -II	<b>Programming in COBOL</b>

**COBOL PROGRAMMING LIST:**

1. Finding Sum of N Natural Numbers.
2. Program to Calculate the Simple and Compound Interest.
3. Program to Sort N Numbers in Ascending/Descending Order.
4. Program to Add / Subtract two Matrices
5. Program to Multiply two Matrices.
6. Program for Inventory Control.
7. Preparation of Mark Sheet/Exam Result Processing.
8. Program for Electricity Bill Preparation.
9. Program for Library Information System-Updating Issues and Receipts.
10. Sequential Files-Sorting/Merging.

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Programme	<b>B.C.A.</b>
Effective From	2020 - onwards
SEMESTER	III
Course	<b>System Analysis and Design</b>

**UNIT-I:**

Introduction to Information System Development: system Analysis and design - Business system concepts - Categories of Information systems - System development Strategies. Managing the application development portfolio: system projects are begun - Managing project review and selection - Preliminary investigation - Selecting the project development strategies.

**UNIT-II:**

Tools for determining system requirement: requirements determination -Fact finding techniques - Tools for documenting procedure and decision. Structured Analysis development strategies: Structured Analysis - Developing Data flow diagrams. Computer Aided systems tools: Role of tools - Categories of automated tools - CASE Tools - Benefits of CASE.

**UNIT-III:**

The Analysis to design transitions: Specifying application requirements - Objectives in designing Information systems - features , Design of computer output: identifying computer Output needs - presenting information - Designing printed output - Designing visual Display output. Design of input and control: What concerns guide input design - Capturing data for input - Input validation.

**UNIT-IV:**

Design of online dialogue: interface-Designing dialogue-Dialogue strategy - Data entry dialogues. Design of files and use of auxiliary storage devices: Basic file terminology - Data structure Diagrams - Types of files - Methods of file organization.

## **UNIT-V:**

Systems Engineering and Quality assurance: Design objectives - Program structure charts - Design of software - Managing Quality assurance - Managing testing practices. Managing system implementation: Training-Conversion-post implementation review. Managing information systems development: Estimation and management of development time – Estimation – Personnel and development management. Hardware and Software selection: Hardware selection – Software Selection.

## **TEXTBOOK :**

- 1) “Analysis and Design of Information Systems”  
James A. Senn  
TMH, New Delhi.  
2<sup>nd</sup> Edition.

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<b>Programme</b>	<b>B.C.A.</b>
Effective from	2020 - onwards
<b>SEMESTER</b>	<b>III</b>
<b>Course</b>	<b>Relational Data Base Management System</b>

**UNIT-I:**

Introduction : purpose of Database systems – View of data – Data models – Database languages – Transaction management – Storage management – database Administrator – Database users – Overall system structure. Entity relationship model: Basic concepts- keys – Entity relationship Diagram- Weak entities sets – Extended ER features : Specialization – generalization. Relational model: Structure of relational databases – The relational Algebra – views.

**UNIT-II:**

SQL: Background – Basic structure – set operations – Aggregate functions – null values – Nested sub queries – Derives Relations – views – modification of database – joined relations – data definition languages – Embedded SQL – other SQL features.

**UNIT-III:**

Integrity constraints : Domain constraints – Referential Integrity – Assertions – triggers- Functional Dependencies. Relational database design: pitfalls in relational database design – Decomposition – normalization using functional Dependencies – normalization using multilevel Dependencies – Normalization using join Dependencies. Object oriented Databases: New database applications – The object Oriented data model – Object Oriented Languages – Persistent programming Languages.

**UNIT-IV:**

Object Relational Databases: Nested relations – Complex types and Object Orientation – querying with complex Data types – Creation of

complex values and objects – Comparison of Object – oriented relational databases.

#### **UNIT-V:**

New Applications: Decision support systems – Data Analysis – Data mining – Data warehousing – Spatial and Geographic Databases – Multimedia Databases – Mobility and personal Databases – Information – retrieval systems- Distributed information systems- The World Wide Web.

#### **TEXT BOOK:**

1. “Database system concepts”  
Abraham Silberschatz, Hendry F. Korth, S. Sudharshan  
Third edition, MC Graw Hill International edition- 1997.

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<b>Programme</b>	<b>B.C.A.</b>
Effective From	2020 - onwards
SEMESTER	III
Course	<b>Programming Language C and Data Structures</b>

**UNIT – I:**

Overview Of C: History Of C – Importance Of C – Basic Structure Of C Programs. Constants, Variables And Data Types. Operators and Expression Managing Input And Output Operations: Reading And Writing A Character – Formatted Input And Output. Decision Making And Branching: Simple IF, IF-Else, Nesting Of IF-ELSE, ELSE-IF Ladder, Switch Statements - GOTO Statements. Decision Making And Looping: WHILE Statement- DO Statement- FOR Statement

**UNIT – II:**

Structure and unions – Arrays: Definition – One -Dimensional Arrays –Declaration Of One -Dimensional Arrays-Initialization Of One - Dimensional Arrays- Two- Dimensional Arrays – Initializing Two Dimensional Arrays – Multidimensional Arrays-Dynamic Arrays.

**UNIT – III:**

Character Arrays And Strings: Introduction – Declaring And Initializing String Variables - Reading Strings From Terminal – Writing Strings To Screen – String Handling Functions – pointers – Files – opening/closing files – file – input/output – error handling during I/O operations – Random access to files – command line arguments.

## **UNIT – IV:**

Data structures : Definition – Categories of data structures - Arrays:  
Array operations –Merging of two arrays - Two dimensional arrays.

Stacks : Definition - Operations on stack -Representation of a stack as an array - Representation of a stack as an Linked list - Evaluation of expression : Infix to Prefix conversion – Infix to Postfix conversion.

Queues : Definition - Operations on Queue - Representation of Queue as an array - Representation of Queue as an linked list – Circular Queues.

Linked list : Definition - Operations on linked list – Circular list - Doubly linked list - Operations on doubly linked list - Polynomial addition.

## **UNIT – V:**

Trees : Definition & Terminology - Binary trees - Traversal of a binary tree: In order, Pre order and Post order. Representation of a Binary trees in memory – Linked representation of binary trees – array representation of binary trees - Operations on a Binary search tree : Searching Operation - Insertion Operation and Deletion operation. Forest Tree : Conversion of a Forest Tree to Binary Tree - Graphs : Definition & Terminology - Graph representations - Graph travels : Depth first search & Breadth first search. Shortest path Algorithm (Using Dijkstra's Algorithm).

### **TEXTBOOK:**

- 1) “Programming in ANSI C”  
E.Balgurusamy
- 2) “Data Structures through C”  
Yashavant Kanethar



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Programme	<b>B.C.A.</b>
Effective From	2020 - onwards
SEMESTER	III
<b>Programming Lab-III</b>	<b>Programming in ‘C’ using Data Structures</b>

**List of Experiments:**

1. Matrix Manipulation.
2. Implement Push Pop operation of a stack using
  - a. Arrays
  - b. Pointers
3. Implement Add, Delete operations of a Queue using
  - a. Arrays
  - b. Pointers
4. Write a program to convert Infix to Postfix expressions using Arrays.
5. Write a program to add two polynomials using pointers.
6. Write a program to create a Doubly Linked List and to insert or delete an element from Doubly Linked List.
7. Perform all Tree Traversals for a Binary Tree using Arrays and Recursive.
8. Implement Dijkstra's algorithm to find the shortest path between given Source and Destination path of graph.

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<b>Programme</b>	<b>B.C.A.</b>
Effective From	2020 - onwards
SEMESTER	IV
Course	<b>Object – Oriented Programming with C++</b>

**UNIT-I:**

Principles Of Object-Oriented Programming : Software Evolution – A Look At Procedure-Oriented Programming – Object-Oriented Programming Paradigm - Basic Concepts Of Object-Oriented Programming - Benefits Of OOP – Object-Oriented Languages - Applications Of OOP.

**UNIT-II:**

Beginning With C++ : What Is C++ - Applications Of C++ - Structure Of C++ Program - A Simple C++ Program - More C++ Statements - An Example With Class. Tokens, Expressions And Control Structures: Introduction-Tokens-Keywods-Identifiers And Constants-Basic Data Types-User-Defined Data Types-Derived Data Types-Symbolic Constants-Type Compatibility-Declaration Of Variables-Dynamic Initialization Of Variables-Reference Variables-Operators In C++-Scope Resolution Operator-Member Dereferncing Operators-Memory Management Operators-Manipulators-Type Cast Operators-Expressions And Their Types-Special Assignment Expressions-Implicit Conversions-Operator Overloading-Operator Precedence-Control Structures. Functions In C++: Introduction - The Main Function - Function Prototyping - Call By Reference - Return By Reference - Inline Functions - Default Arguments - Const Arguments - Function Overloading - Friend And Virtual Functions.

**UNIT-III:**

Classes And Objects : Introduction - Specifying A Class - Defining Member Functions -A C++ Program With Class - Making An Outside Function Inline - Nesting Of Member Functions - Private Member Functions

- Arrays Within A Class - Memory Allocation For Objects - Static Data Members - Static Member Functions - Arrays Of Objects - Objects As Function Arguments - Friendly Functions - Returning Objects - Const Member Functions -Pointers To Member - Local Classes. Constructors And Destructors: Introduction-Constructors-Parameterized Constructors-Multiple Constructors In A Class-Constructors With Default Arguments-Dynamic Initialization Of Objects-Copy Constructor-Dynamic Constructors-Constructing Two-Dimensional Arrays-Const Objects-Destructors.

#### **UNIT-IV:**

Operator Overloading And Type Conversions: Introduction-Defining Operator Overloading-Overloading Unary Operators-Overloading Binary Operators-Overloading Binary Operators Using Friends-Manipulation Of Strings Using Operators-Rules For Overloading Operators-Type Conversions – Inheritance Extending Classes: Introduction-Defined Derived Classes-Single Inheritance-Making A Private Member Inheritable-Multilevel Inheritance-Multiple Inheritance-Hierarchical Inheritance-Hybrid Inheritance-Virtual Base Classes-Abstract Classes-Constructors In Derived Classes-Member Classes: Nesting Of Classes. Pointers, Virtual Functions And Polymorphism: Introduction-Pointers To Objects-this Pointer-Pointer To Derived Classes-Virtual Functions-Pure Virtual Functions.

#### **UNIT-V:**

Managing Console I/O Operations: Introduction-C++ Streams-C++ Stream Classes-Unformatted I/O Operations-Formatted Console I/O Operations-Managing Output With Manipulators. Working With Files: Introduction-Classes For File Stream Operations-Opening And Closing A File-Detecting End-Of-File-More About Open():File Modes-File Pointers And Their Manipulations-Sequential Input And Output Operations-Updating A File: Random Access-Error Handling During File Operations-Command-Line Arguments. Templates: Introduction -Class Templates - Class Templates With Multiple Parameters - Function Templates - Function Templates With Multiple Parameters - Overloading Of Template Functions -

Member Function Templates. Exception Handling: Introduction-Basics Of Exception Handling-Exception Handling Mechanism-Throwing Mechanism-Catching Mechanism-Rethrowing An Exception-Specifying Exceptions.

**TEXTBOOK:**

- 1) “Object-Oriented Programming with C++”  
E.Balagurusamy,TMH ,New Delhi.  
2<sup>nd</sup> Edition.

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Programme	<b>B.C.A.</b>
Effective From	2020 - onwards
SEMESTER	IV
Course	<b>Software Engineering</b>

**UNIT - I**

Introduction - Software Engineering Discipline - Evolution and Impact - Programs Vs Software Products. Software Life Cycle Models: Use of a Life Cycle Models - Classical Waterfall Model –Iterative Waterfall Model - Prototyping Model - Evolutionary Model - Spiral Model. Software Project Management: Responsibilities of a Software Project Manager - Project Planning - Metrics for Project Size Estimation - Project Estimation Techniques -Risk Management.

**UNIT - II**

Requirements Analysis and Specification: Requirements Gathering and Analysis –Software Requirements Specification (SRS) - Formal System Development Techniques. Software Design: Characteristics of a Good Software Design - Cohesion and Coupling -Neat Arrangement - Software Design Approaches.

**UNIT - III**

Function-Oriented Software Design: Overview of SA/SD Methodology - Structured Analysis – Data Flow Diagrams (DFDs).Object Modeling Using UML: Overview of Object-Oriented Concepts – UML Diagrams - Use Case Model - Class Diagrams - Interaction Diagrams - Activity Diagrams - State Chart Diagram.

**UNIT - IV**

User Interface Design: Characteristics of a Good User Interface - Basic Concepts - Types of User Interfaces - Component-Based GUI Development; Coding and Testing: Coding - Testing - UNIT Testing - Black-Box Testing - White-Box Testing - Debugging -Integration Testing - System Testing.

**UNIT - V**

Software Reliability and Quality Management: Software Reliability - Statistical Testing –Software Quality - Software Quality Management System - ISO 9000.Computer Aided Software Engineering: CASE Environment - CASE support in Software Life Cycle - Characteristics of CASE Tools - Architecture of a CASE Environment. Software Maintenance: Characteristics of Software Maintenance - Software Reverse Engineering - Software

Maintenance Process Models - Estimation of Maintenance Cost. Software Reuse: Issues in any Reuse Program - Reuse Approach.

### **TEXT BOOK**

1. Rajib Mall, "Fundamentals of Software Engineering", 3rd Edition, Prentice Hall of India Private Limited, 2008.

### **REFERENCE BOOKS**

1. Rajib Mall, "Fundamentals of Software Engineering", 4th Edition, Prentice Hall of India Private Limited, 2014.
2. Richard Fairley, "Software Engineering Concepts", TMGH Publications, 2004.

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Programme	<b>B.C.A.</b>
Effective From	2020 - onwards
SEMESTER	IV
Course	<b>Analysis of Algorithms</b>

**Unit-I**

Introduction – Fundamentals of Algorithmic Problem Solving – Important Problem Types –Fundamental Data Structures.

**Unit-II**

Fundamentals of the Analysis of Algorithm Efficiency: Analysis framework – Asymptotic Notations and Basic Efficiency Classes- Mathematical analysis of recursive and non-recursive Algorithms – Empirical Analysis of Algorithms – Algorithm Visualization.

**Unit-III**

Brute Force: Selection Sort and Bubble Sort – Sequential Search and Brute-Force String Matching –Closest pair and Convex Hull Problem by Brute Force – Exhaustive Search.

**Unit-IV**

Divide and conquer Technique: Merge Sort – Quick Sort – Binary Search – Binary Tree Traversal and Related Properties. Decrease and Conquer: Insertion sort – Depth First Search and Breadth First Search – Topological Sorting.

**Unit-V**

Greedy Technique: Prim's Algorithm -Kruskal's algorithm – Dijkstra's algorithm. Backtracking: NQueens problem – Hamiltonian circuit problem – Subset sum problem.

**TEXT BOOK**

1. Anany Levitin “Introduction to the Design and Analysis of Algorithms”, 2nd Edition, Pearson Education,2009.

**REFERENCE BOOKS**

1. Thomas H.Cormen, Charles E.Leiserson, Ronald L.Rivest, “Introduction to algorithms”, 2nd Edition, Prentice Hall, 1990.
2. S.K. Basu, “Design methods and Analysis of Algorithms”, 2nd Edition, Prentice Hall, 2005.

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Programme	<b>B.C.A.</b>
Effective From	2020 - onwards
SEMESTER	IV
Programming Lab -IV	<b>Programming in C++ using OOPs</b>

**List of Experiments:**

1. Classes and Objects
2. Functions
  - a. Inline functions
  - b. Friend functions
  - c. Functions with default argument
  - d. Virtual functions
3. Constructors and Destructors
  - a. Empty constructor
  - b. Parameterized constructor
  - c. Constructors with default arguments
  - d. Copy constructors
4. Polymorphism
  - a. Function overloading
  - b. Operator overloading
5. Inheritance
  - a. Single
  - b. Multilevel
  - c. Multiple
  - d. Hirarchical
  - e. Hybrid
6. Files
7. Templates
  - a. Function templates
  - b. Class templates
  - c. Member function templates



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<b>Programme</b>	<b>B.C.A.</b>
Effective From	2020 - onwards
<b>SEMESTER</b>	<b>V</b>
Course	<b>E-Commerce</b>

**UNIT – I:**

Electronic Commerce: Electronic Commerce - Electronic Data Interchange - Value Added Networks – Electronic Commerce Over The Internet – Internet Commerce Examples – Commerce Net. PCs and Networking: Networking – Communication Media. Electronic Mail: Computer Communication Systems – ISO’S Open System Interconnection Model – Electronic Mail – The X.400 Message Handling System – Internet Mail – E-Mail Security – X.500 Directory Services – Mail User Agent.

**UNIT – II:**

The Internet: The Internet : A Brief Introduction- Internet Communication Protocols – Internet Services and Resources – Internet Mail – Internet Search – Concerns About The Internet – Browsers – Hypertext Markup Language - Java – The Java Electronic Commerce Framework – Internet 2. Intranets: Intranet - Intranet services – Intranet Implementation – The Webmaster. Electronic Data Interchange: Electronic Data Interchange - Costs and Benefits – Components of EDI Systems – EDI Implementation Issues – Legal Aspects.

**UNIT – III:**

The UN/EDIFACT Standard: Introduction - An EDIFACT Message – Interchange structure – UN/EDIFACT Message Directories. The Internet and Extranets for Electronic Commerce: E-Commerce – Commerce Over The

Internet – Commerce Over Extranets. Identification and Tracking Tools for Electronic Commerce: The EAN System – EANCOM – Article. Numbering – Bar Coding – The serial shipping container code and the EAN label – EAN Location Numbers – How It Works: Warehousing Example. Internet Bandwidth and Technology Issues: Bandwidth Issues – Technology Issue For The Internet/NII – NII Standards – NII services – Actors In The NII – NII Agenda – GII.

#### **UNIT – IV:**

Security Issues: Security Concerns – Security solutions - Electronic Cash Over The Internet – Security and UN/EDIFACT Messages – Internet Security – Guidelines For Cryptography Policy. Business Process Reengineering: Introduction - Approach to BPR – Strategic Alignment Model – BPR Methodology. Management of Change: Change Management – Change Management In Public Administration – The Implementation Plan.

#### **UNIT – V:**

Legal Issues: Legal Issues - Risks: Paper Document Versus Electronic Document – Technology For Authenticating an Electronic Document – Laws For E-Commerce – EDI Interchange Agreement – Legal Issues For Internet Commerce. E-Commerce in India: EDI in India – The Internet in India – Laws For E-Commerce in India. Getting Started: Getting Connected: What Do You Need? – Setting Up a Website – Web Servers – Business -To-Business EC - Payment For Goods and Services – Bottlenecks.

**Case Studies:** EDI in Indian customs- US Electronic Procurement- Banks - EDI Pilot Project in the Automotive Industry.

#### **TEXT BOOK:**

- 1) “ E – Commerce - The cutting edge of Business “  
Kamlesh K Bajaj and Debjani Nag. Fourth Reprint 2000, TMH, New Delhi.

**PERIYAR UNIVERSITY , SALEM – 636 011.**  
**(PRIDE)**

<b>Programme</b>	<b>B.C.A</b>
Effective From	2020 - onwards
SEMESTER	V
Course	<b>Operating System</b>

**UNIT-I :**

Operating system overview : Operating system objectives and functions – Evaluation of O.S - Major achievements . Process Description and control : Process -Process states - Process description and control.

**UNIT-II :**

Threads , Concurrency : Principles of concurrency - Mutual Exclusion –Semaphores - Message passing. Deadlock : Principles of deadlock - Deadlock prevention - Deadlock avoidance - Deadlock detection.

**UNIT-III :**

Memory Management : Requirements - Memory partitioning – Paging -Segmentation. Virtual memory : Hardware and control structures - Operating system software.

**UNIT-IV :**

Uniprocessor scheduling : Types of processor – Scheduling - Scheduling algorithm -Multiprocess scheduling. I/O Management and Disk scheduling : I/O Devices-Organization of the I/O function - I/O Buffering - Disk scheduling.

**UNIT-V:**

File Management : Overview - File organization & Access - File Directories-File sharing-Record Blocking –Secondary storage management. Case studies: Unix-Process Management, Memory Management, I/O Management & File Management.

**TEXT BOOK :**

1. “Operating Systems – Internals & Design Principles”  
William stallings, Prentice-Hall of India P.Ltd,  
New Delhi-110001, 5<sup>th</sup> Edition.

**PERIYAR UNIVERSITY, SALEM – 636011  
(PRIDE)**

<b>Programme</b>	<b>B.C.A</b>
Effective From	2020 - onwards
SEMESTER	V
Course	<b>Programming in VISUAL BASIC</b>

**UNIT – I:**

Welcome to VB: What is Visual Basic – Features of Visual Basic – Visual Basic Editions – The Visual Basic Philosophy – Developing an Application. Creating an Application : Objectives – The Tool Box – Project Explorer – The Properties Window – The Form Window – Understanding Projects – What Does Visual Basic 6 have for you to Create Applications. 2<sup>nd</sup> Look at IDE, Forms and Controls: Objectives - The Form – The Working with a Control – Opening the Code Window. Variables in Visual Basic: Objectives – What is a Variable.

**UNIT – II:**

Writing Code In VB: Objectives – The Code Window - The Anatomy of Procedure – Editor Features - The For ...Next Statement –The Decision Maker ... If- Loop – The While Loop-Selective Case ... End Select. Working With Files: Objectives – Visual Basic File System Controls – Types of Files – Working with Files.

**UNIT – III:**

Menus: Objectives – Building the User Interface. The first step – All about Menus. MDI Applications: Why MDI Forms – Features of an MDI Form – Loading MDI Forms and Child Forms – The Active Form property. Debugging Tips: Objectives – The Debugging Methods. The Common Dialog Control: Working with the Common Dialog Control – The file open Dialog Box-Saving a file-Changing the color. Introduction To Databases: Why Databases – What is a Database – Which Database. Working with the Data Control: The Data Control – The Bound Controls – Caution – Coding.

#### **UNIT – IV:**

DAO: The Jet Database Engine – Functions of the Jet Database Engine – SQL – The DAO Object Model. Additional Controls Available in VB 6.0 – Objectives – SSTab Control. ActiveX Data Objects – Objectives – Why ADO – Establishing a Reference. .

#### **UNIT – V:**

Crystal And Data Reports: Crystal Reports – Data Report. Distributing your application: Objectives – Working with the Packaging and Deployment Wizard. ActiveX: Objectives – What is ActiveX – Why ActiveX. ActiveX and Web pages: Objectives – ActiveX and Internet. ActiveX Documents: The Application Form Document. Sample Application in VB Like Inventory Control.

#### **TEXT BOOK:**

1. “Programming With Visual Basic 6.0”
  - Mohammed Azam.
  - Vikas Publishing House Pvt Ltd.

**PERIYAR UNIVERSITY , SALEM – 636 011.  
(PRIDE)**

<b>Programme</b>	<b>B.C.A</b>
Effective From	2020 - onwards
<b>SEMESTER</b>	<b>V</b>
Programming Lab -V	<b>Programming in VISUAL BASIC</b>

**LIST OF EXPERIMENTS:**

1. Construction of an Arithmetic Calculator (Simple).
2. Preparation of Students Mark Sheet.
3. Personal Information System (Using Tables).
4. Quiz Program System (Using Tables).
5. Railways Reservation System (Using Tables).
6. Voters Information System (Using Tables).
7. Library Information System (Using Tables).

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(PRIDE)**

<b>Programme</b>	<b>B.C.A.</b>
Effective From	2020 - onwards
<b>SEMESTER</b>	<b>VI</b>
Course	<b>Computer Networks</b>

**UNIT – I**

Introduction - Network Hardware - Network Software - Reference Models: OSI Reference model. Physical Layer: Guided Transmission media- Wireless Transmission - Public Switched Telephone Network- The Mobile Telephone System.

**UNIT - II**

Data Link Layer: Data Link Layer Design Issues - Error Detection and Correction - Elementary protocols - Sliding Window Protocols - MAC sub layer: Channel allocation problem -Multiple access protocols.

**UNIT – III**

Network Layer: Network Layer Design Issues- Routing Algorithms- Congestion control algorithm - Quality of Service -Internetworking.

**UNIT - IV**

Transport Layer: Transport Services - Elements of transport protocols - Congestion control – Internet transport protocol - UDP - TCP.

**UNIT - V**

Application layers: Domain name system - Electronic mail - The World Wide Web. Network Security: Cryptography - Symmetric, Public key algorithms.

**TEXT BOOK**

1. David J.Wetherall, Andrew S.Tanenbaum, "Computer Networks",5th Edition,Pearson Education, 2012.

**REFERENCE BOOKS**

1. B.A. Forouzan, "Data Communication and Networking", 4th Edition, Tata McGraw Hill, 2007.
2. B.A. Forouzan,FirouzMosharraf, "Computer Networks - A Top down Approach", Tata McGraw Hill,2012.
3. A.Leon&M.Leon, "Introduction to Information Technology", 1st Edition, Vijay Nicole Publications,

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**(PRIDE)**

<b>Programme</b>	<b>B.C.A.</b>
Effective From	2020 - onwards
SEMESTER	VI
Course	<b>Data Mining</b>

**UNIT – I**

Introduction: Data mining application – data mining techniques – data mining case studies- the future of data mining – data mining software - Association rules mining: basics- task and a naïve algorithm- Apriori algorithm – improve the efficient of the Apriori algorithm – mining frequent pattern without candidate generation (FP-growth) – performance evaluation of algorithms.

**UNIT – II**

Classification : Introduction – decision tree – over fitting and pruning - DT rules- Naive bayes method estimation predictive accuracy of classification methods - other evaluation criteria for classification method – classification software.

**UNIT – III**

Cluster analysis: cluster analysis – types of data – computing distances-types of cluster analysis methods- partitioned methods – hierarchical methods – density based methods – dealing with large databases – quality and validity of cluster analysis methods - cluster analysis software.

**UNIT – IV**

Web data mining: Introduction- web terminology and characteristics- locality and hierarchy in the web content mining-web usage mining- web structure mining – web mining software - Search engines: Search engines functionality- search engines architecture – ranking of web pages.

**UNIT – V**

Data warehousing: Introduction – Operational data sources- data warehousing - Data warehousing design – Guidelines for data warehousing implementation - Data warehousing metadata – Online analytical processing (OLAP): Introduction – OLAP characteristics of OLAP system – Multidimensional view and data cube - Data cube implementation - Data cube operations OLAP implementation guidelines.

**TEXTBOOK**

1. G.K. Gupta, “Introduction to Data mining with case studies”, 2nd Edition, PHI Private limited, New Delhi, 2011.



## **REFERENCE BOOK**

1. Arun K Pujari, "Data Mining Techniques", 10th impression, University Press, 2008.

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(PRIDE)**

<b>Programme</b>	<b>B.C.A</b>
Effective From	2020 - onwards
<b>SEMESTER</b>	<b>VI</b>
<b>Course</b>	<b>Programming in JAVA and JAVASCRIPT</b>

**UNIT-I:**

Fundamentals of object-oriented programming, Java evolution, overview of JAVA language: Introduction- JAVA program structure – simple JAVA program- JAVA tokens- JAVA statements- Implementing a JAVA program- JAVA virtual machine- command line arguments.

**UNIT-II :**

Constants, variables and data types, operators and expressions , decision making and branching, decision making and looping.

**UNIT-III :**

Class, Objects and methods, arrays, strings and vectors, interfaces: Multiple inheritance, packages : Putting classes together, Multithreaded programming.

**UNIT-IV :**

Managing errors and Exceptions, Applet programming, Graphic programming, managing i/o files in JAVA.

**UNIT-V :**

Introduction to JAVA SCRIPT, placing JavaScript in an HTML file, Using variables, using functions, event handlers, Objects: predefined java script objects, the document object, window object, java script arrays, math and date object, handling strings, java script and forms.

## **TEXT BOOK :**

1. “Programming with JAVA”  
E.Balagurusamy  
T.M.H, New Delhi  
Second Edition  
(Unit I to IV)
2. “Java Script a beginners Guide”  
John Pollock  
T.M.H, New Delhi  
(Unit V)

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**(PRIDE)**

<b>Programme</b>	<b>B.C.A</b>
Effective From	2020 - onwards
SEMESTER	VI
<b>Programming Lab -VI</b>	<b>Programming in JAVA and JAVA SCRIPT</b>

**JAVA SCRIPT Programming List :**

1. To develop a Dynamic Web Page using Java Script.
2. Program to create an HTML page with Java Script.
3. Program to create an HTML page using Event Handling.
4. Develop a Java Script using document and window object.
5. Program to create a Java Script clock.
6. Program to work with Forms Using Java Script.

**JAVA Programming List :**

7. Program to create a simple applet and application
8. Using java class and objects
9. Using java Inheritance and Interface
10. sing Arrays in java
11. Using Threads and Multithreads
12. Using AWT package
13. Using I/O package