

**FACULTY OF SCIENCE**

**SYLLABI**

**FOR**

**COMPUTER APPLICATIONS  
(ELECTIVE)**

1st, 2nd & 3rd Year

**(SEMESTER SYSTEM)**

**PART-I, II, III**

**(First to Six Semester)**

**For**

**2020-21 SESSION**

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**PANJAB UNIVERSITY, CHANDIGARH.**

**Computer Applications (Elective) for B.A./B.Sc./B.Com. I, II, III (Examination 2020-21)**

**SUMMARY CHART  
COMPUTER APPLICATIONS**

Sr. No.	Paper	Name of Paper	Lectures per week	Max. Marks			Exam. Hours
				Ext.	Int.	Total	
<b>First Semester</b>							
1	CA01	Fundamentals of IT	6	30	5	35	3
2	CA02	Application Software	6	30	5	35	3
3	PCA01	Practical Based on CA01 and CA02	6	30	-	30	3
<b>Second Semester</b>							
4	CA03	C Programming Language	6	30	5	35	3
5	CA04	Operating System Concepts	6	30	5	35	3
6	PCA02	Practical Based on CA03	6	30	-	30	3
<b>Third Semester</b>							
7	CA05	Programming in C++	6	30	5	35	3
8	CA06	Web Designing	6	30	5	35	3
9	PCA03	Practical Based on CA05 and CA06	6	30	-	30	3
<b>Fourth Semester</b>							
10	CA07	Data Structure	6	30	5	35	3
11	CA08	Java Programming	6	30	5	35	3
12	PCA04	Practical Based on CA07 and CA08	6	30	-	30	3
<b>Fifth Semester</b>							
13	CA09	Programming with VB. NET	6	30	5	35	3
14	CA10	Database Management using Oracle	6	30	5	35	3
15	PCA05	Practical Based on CA09 and 10	6	30	-	30	3
<b>Sixth Semester</b>							
16	CA11	Computer Networks	6	30	5	35	3
17	CA12	Working with Linux	6	30	5	35	3
18	PCA06	Practical Based on CA12	6	30	-	30	3

## FIRST SEMESTER

### Paper –CA01: Fundamentals of IT

**Total Periods: 60**  
**(6 Periods/week)**

**Max. Marks: 30+5**  
**Exam Hours: 3**

**Objectives:** This course will enable students to get familiar with computer fundamentals and programming fundamentals.

#### **Note :**

- i. The Question Paper will consist of Four Units.
- ii. Examiner will set total of **NINE** questions comprising **TWO** questions from each Unit and **ONE** compulsory question of short answer type covering whole syllabi.
- iii. The students are required to attempt **ONE** question from each Unit and the Compulsory question.
- iv. All questions carry equal marks unless specified.

#### **UNIT - I**

**Computer Appreciation:** Introduction to computers, characteristics of computer; History of computers; Classification of computers on basis of size: (Micro, Mini, Mainframe and super computers), Working Principles, Generations; Applications of computers; Commonly used terms–Hardware, Software, Firmware; Basic Computer Organization: Block diagram of computer system- Input unit, Processing Unit and Output Unit; Description of Computer input devices: Keyboard, Mouse, Trackball, Light Pen, Touch screens, Scanner, Digital Camera; Output devices: Monitors, Printers, Plotters

**Computer Memory:** Representation of information: BIT, BYTE, Memory, Memory size; Units of measurement of storage; Main memory: Storage evaluation criteria, main memory organization, RAM and ROM and their types; Secondary storage devices: Sequential Access Memory, Direct Access Memory, Magnetic Tapes, Magnetic disks, Optical disks: CD, DVD; Memory storage devices: Flash Drive, Memory card

#### **UNIT - II**

**Types of software:** System, Utility and Application software; Programming Languages: Generation of Languages; Translators - Interpreters, Compilers, Assemblers and their comparison.

**Introduction to Computer based Problem-solving:** Steps of development developing of a program, Algorithm development, Flowchart, Pseudo codes, basic programming constructs, Documentation, Testing and Debugging

#### **UNIT - III**

**Understanding Number System:** Computer arithmetic; Number systems: Decimal, Binary, Octal, Hexadecimal, Conversions between different number systems

**Character Codes:** Introduction, need, ASCII, EBCDIC and Unicode character sets

#### **UNIT - IV**

**Understanding Operating System using DOS:** Introduction to operating systems and its functions, DOS and versions of DOS, Booting sequence; Warm and Cold Boot; Concepts of files and directories, Wildcard characters, Types of DOS commands, Internal Commands: cls, copy con, type, ver, volume, prompt, path name, date, time, md, cd, rd, copy, Del; External Commands: doskey, format, unformat, xcopy, fdisk, attrib, chkdsk; Introduction to Config.Sys and Autoexec.Bat.

**Windows Operating System:** Anatomy of windows, Taskbar Settings, Managing folders and files using Windows Explorer, Searching Files and folders, Customizing Windows, Paint, WordPad, Notepad, Control Panel.

#### **Suggested Reading :**

##### **Essential :**

1. P.K. Sinha : Computer Fundamentals, BPB Publications, Latest reprint
2. Mathur Rajiv: DOS 6.2 Quick Reference, Galgotia.

##### **Further Readings:**

3. Basandra, S.K. : Computers Today, Galgotia.
4. Fundamentals of Computers, PHI, New Delhi
5. Cowart, Robert, Using Microsoft Windows 2000 Professional, Que Publishing

## Paper –CA02: Application Software

**Total Periods: 60**  
**(6 Periods/week)**

**Max. Marks: 30+5**  
**Exam Hours: 3**

**Objectives:** This course will enable students to get familiar with Application Software for Word processing, Spreadsheet, Presentation and Data Base Management.

### **Note :**

- i. The Question Paper will consist of Four Units.
- ii. Examiner will set total of **NINE** questions comprising **TWO** questions from each Unit and **ONE** compulsory question of short answer type covering whole syllabi.
- iii. The students are required to attempt **ONE** question from each Unit and the Compulsory question.
- iv. All questions carry equal marks unless specified.
- v. **Examiner will set paper independent of specific Word processing, Spreadsheet, Presentation and Data Base Management software.**

### **UNIT - I**

**Word Processing:** Opening, Creating, Saving, Printing and closing Documents, Using the Interface (Menu Toolbars), Editing Text (Copy, Delete, Move), Finding and Replacing Text, Spell Check, Autocorrect; Auto text, Character formatting, Page formatting; Document Enhancement: Adding Borders and shading, Adding Headers and Footers, Setting up Multiple columns, Adjusting Margins and Hyphenating Documents; Mail Merge: Creating Master Document and Data Source, Merging and printing Documents; Inserting Pictures, Tables, Macros: create, execute and reusability feature

### **UNIT - II**

**Spreadsheets:** Worksheet overview, Row, Column, Cells, Menus, Creating, Opening, Saving and printing worksheet; Auto fill, working with Formulae, Data formatting (number formatting, date formatting), Working with Ranges, Absolute, relative and Mixed addressing, creating, sorting and filtering Data Base; Charts: creating chart, adding Titles, Legends etc. to charts, Printing Charts; Macros: creating Macros, Recording Macros, Running Macros, Assigning shortcuts to Macros; Functions (Statistical, financial, Mathematical, string, date and time).

### **UNIT - III**

**Presentation Software:** Creating, saving, and printing presentations; selecting design templates, Inserting tables and images, animations and transitions, Auto content Wizard, Changing Background

### **UNIT - IV**

**Databases:** Introduction to database, Creating database using Wizard or from scratch, creating tables using wizard, entering data, using design view, saving, inserting, editing, Changing properties of fields, setting primary key.

### **Suggested Reading :**

1. Mansfield Ron: MS Office, Tata McGraw Hill.
2. OOoAuthors Team : Getting Started with OpenOffice.org 3.3, Friends of OpenDocument
3. Singleton, Roderick G.: OpenOffice.org User Guide.

**Paper – PCA01: Practical based on CA01 and CA02**

**Total Periods: 60  
(6 Periods/week)**

**Max. Marks: 30  
Exam Hours: 3**

- Introduction to Autoexec.bat, Modifying config.sys, Important DOS commands
- Word Processing: Formatting, Spelling Checking, Mail-merging of documents, Macros
- Using worksheets/Database for Payroll, Inventory etc.
- Creating and managing Database
- Preparation of presentation on topics covered in Theory paper

Note: Paper will be set at the time of examination. Due weight age may be given to the practical notebook and Assignments in evaluation.

**SECOND SEMESTER**  
**Paper CA03: C Programming Language**

**Total Periods: 60**  
**(6 Periods/week)**

**Max. Marks: 30+5**  
**Exam Hours: 3**

**Objective: The course will enable students to understand the basics of C programming language.**

**Note :**

- i. The Question Paper will consist of Four Units.
- ii. Examiner will set total of **NINE** questions comprising **TWO** questions from each Unit and **ONE** compulsory question of short answer type covering whole syllabi.
- iii. The students are required to attempt **ONE** question from each Unit and the Compulsory question.
- iv. All questions carry equal marks unless specified.

**UNIT - I**

1. **Basics of 'C' Language:** History, Structure of a C program, Data types, Constants and variables, Operators and Expressions, I/O functions: Formatted & Unformatted Input/Output
2. **Control constructs:** If, If-else, nested if-else, else-if ladder, switch, goto, for, while, do... while, jumps in loops: break and continue

**UNIT - II**

3. **Preprocessor:** #define, #include, #undef, #conditional compilation directives (#if, #else, #elif, #endif, #ifdef and #ifndef), Storage classes, Header files (stdio.h, ctype.h, string.h, math.h, stdlib.h, time.h); Type casting, Type conversion, Scope Rules: Local and Global variables
4. **Functions:** library functions, user defined functions, scope rule of functions, Parameter passing: call by value and call by reference, calling functions with Arrays, Recursion: Basic concepts, Design examples (Tower of Hanoi)

**UNIT - III**

5. **Arrays:** Creating and using One dimensional and two dimensional arrays
6. **Strings:** Introduction to strings, declaring and initializing string variables, reading and writing strings, string handling functions
7. **Pointers:** & and \* operators, Declaring and initializing pointers, Pointer expression, Pointer assignments, Pointer arithmetic. The dynamic memory allocation functions – malloc and calloc, Pointer vs Arrays, Passing Array to functions, Arrays of pointers, and Functions with variable number of arguments.

**UNIT - IV**

8. **Structures:** Basics of Structures, Declaring a structure, Referencing structure elements, Array of structures, passing structures to functions. **Unions:** Declaration, Uses; Enumerated data types, type def
9. **File Handling:** Introduction, creating a data file, opening and closing a data file, file Pointers, file accessing functions (fopen, fclose, puts, getc, fprintf); argc and argv; File opening modes: Text mode, Binary mode.

**Suggested Reading :**

**Essential :**

1. Yashavant P. Kanetkar : Let us C, BPB Publications, New Delhi.

**Further Reading :**

2. Balaguruswami : Programming with C Language, Tata McGraw Hill, New Delhi
3. Schaum Series: Programming in C, McGraw Hills Publishers, New York.
4. Salaria, R. S. : Application Programming in C, Khanna Book Publishing. New Delhi.
5. Salaria, R.S. : Test Your Skills in C, Salaria Publications, New Delhi.
6. Byron S. Gottfried : Programming in C, McGraw Hills Publishers, New York.
7. M.T. Somashekara : Programming in C, Prentice Hall of India.

## Paper-CA04: Operating System Concepts

**Total Periods: 60**  
**(6 Periods/week)**

**Max. Marks: 30+5**  
**Exam Hours: 3**

**Objective: The course will enable the students to get familiar with concepts of operating system in general.**

**Note:**

- i. The Question Paper will consist of Four Units.
- ii. Examiner will set total of **NINE** questions comprising **TWO** questions from each Unit and **ONE** compulsory question of short answer type covering whole syllabi.
- iii. The students are required to attempt **ONE** question from each Unit and the Compulsory question.
- iv. All questions carry equal marks unless specified.

### UNIT - I

1. Operating System: Introduction, User view, system view, OS and its functions, Computer system operations, Storage structure, I/O structure, Computer system Architecture: Single processor systems, Multiprocessor systems, clustered systems, Distributed Systems, Special purpose systems: Real time embedded systems, Multimedia systems, Handheld systems

### UNIT - II

2. Process Management: Process, Process life cycle, PCB, definition of Context switch and thread, CPU Scheduling: Basic concepts, Different types of schedulers, scheduling criteria, and Scheduling algorithm: FCFS, SJF, Priority, Round Robin, Multiple Queue scheduling and Multiple Feedback Queue scheduling
3. Deadlocks: System Model, Resource Allocation graph, necessary and sufficient conditions for Deadlocks, Introduction to methods for handling deadlocks, deadlock detection and recovery

### UNIT - III

4. Memory management: Logical vs Physical address space, Dynamic loading and linking, Swapping, Introduction to Paging and Segmentation, Virtual Memory-Demand paging
5. Introduction to Page replacement algorithms: FIFO, Optimal, LRU, Stack algorithms and LRU approximation

### UNIT - IV

6. File System: File System structure, Allocation methods, contiguous allocation, linked allocation, indexed allocation; Directory Structure: Single level, Two level, Tree and Acyclic structure; Directory implementation-linear list, hash table; Free Space Management- Bit vector, linked list, grouping
7. Device Management: Disk structure, disk scheduling, FCFS, SSTF, SCAN, C-SCAN and LOOK scheduling algorithms, Control of various devices. Device drivers, Interrupt driven and poll driven data transfers

**Suggested Reading :**

**Essential :**

1. Abraham Silverschatz & Peter B Galvin : OS Concepts, Addison Wesley

**Further Reading :**

2. Donovan . John J. : System Programming, McGraw-Hill
3. Singhal, : Advanced Concepts in Operating System, McGraw Hill.

**Paper PCA02: Practical based on CA03**

**Total Periods: 60**  
**(6 Periods/week)**

**Max. Marks: 30**  
**Exam Hours: 3**

- Developing and writing Programs in C Language to demonstrate -
  - The use of constants, Variables, operators and expressions
  - Input and output statements, library functions
  - Conditional statements: if-else, nested-if, switch
  - Branching statements: Jump statements, break, continue, goto
  - Loops: while, do-while, for
  - Functions, recursive functions
  - Call – by value/reference
  - Arrays - Single and Multidimensional Array
  - String handling
  - Pointers, passing pointers to functions, pointers and arrays
  - Structure – accessing members, nested structures, structure with pointers
  - File handling , Creating and processing data files
  - Use of command line arguments



**Third Semester**  
**Paper CA05: Programming in C++**

**Total Periods: 60**  
**(6 Periods/week)**

**Max. Marks: 30+5**  
**Exam Hours: 3**

**Objective: The course enables the students to get familiar with the features of Object Oriented programming language using C++.**

**Note:**

- i. The Question Paper will consist of Four Units.
- ii. Examiner will set total of **NINE** questions comprising **TWO** questions from each Unit and **ONE** compulsory question of short answer type covering whole syllabi.
- iii. The students are required to attempt **ONE** question from each Unit and the Compulsory question.
- iv. All questions carry equal marks unless specified.

**UNIT - I**

**Introduction to Object Oriented Programming Concepts:** Object, Class, Encapsulation, Data hiding, Inheritance and Polymorphism; analysis and design of system using object oriented approach

**C++ Basics:** Token, keywords, Identifiers, Basic data types, user defined and derived data types, symbolic constants, declaration of variables, dynamic initialization of variables, reference variables, operators in C++, I/O streams, Control structures

**Classes and Objects:** Specifying a class, defining data members and member functions, private and public member functions, member function definition inside/outside the class declaration, scope resolution operator, nesting of member functions, creating and declaring objects, accessing class data members, accessing member functions, static data members and member functions

**UNIT - II**

**Constructors and destructors:** Introduction, default constructors, parameterized constructors, multiple constructors in a class, copy constructors, dynamic constructors; Destructors: Definition and use

**Functions in C++:** Function prototyping, pass by value, pass by reference, In line functions, default arguments, const arguments, function overloading, Friend functions, Objects as function arguments, friendly functions, returning objects

**Arrays and Strings:** creating and manipulating arrays with in a class, arrays of objects, Creating and manipulating String Objects, Accessing Characters in strings

**UNIT - III**

**Extending Classes using Inheritance:** Introduction, base class, derived class, defining derived classes, visibility modes: private, public, protected; single inheritance: privately derived, publicly derived; making a protected member inheritable, access control to private and protected members by member functions of a derived class, multilevel inheritance, virtual base classes, abstract classes, nesting of classes

**Pointers, Virtual Functions and polymorphism:** virtual and pure virtual functions, Function overloading, operator overloading

**UNIT - IV**

**Console I/O Operations:** C++ Stream Classes, Unformatted I/O functions-put(), get(), getline(), write(), Formatting with ios class functions and flags, Manipulators

**Files and Streams:** Text and binary streams, The stream class hierarchy, Processing files, declaring files, opening files using open() function or constructor function, closing files, String I/O, Sequential and random Access, File updation

**Suggested Reading:**

<b>Essential :</b>		
1.	Stroustrup, Bjarne	: C++ Programming Language, 3 <sup>rd</sup> Ed., Dorling Kindessley, Latest reprint.
<b>Further Reading :</b>		
2.	Robert Lafore	: Object Oriented Programming in Turbo C++, Galgotia Pub
3.	Balaguruswamy, E.	: Object Oriented Programming with C++, TMH., Latest reprint

**Paper-CA06: Web Designing**  
**Total Periods: 60**  
**(6 Periods/week)**

**Max. Marks: 30+5**  
**Exam Hours: 3**

**Objective: This course enables students to create web pages using HTML, CSS, Java script and dream weaver.**

**Note:**

- i. The Question Paper will consist of Four Units.
- ii. Examiner will set total of **NINE** questions comprising **TWO** questions from each Unit and **ONE** compulsory question of short answer type covering whole syllabi.
- iii. The students are required to attempt **ONE** question from each Unit and the Compulsory question.
- iv. All questions carry equal marks unless specified.

**UNIT - I**

**Web Terminology:** Web Server; Web Client/Browser, Understanding how a Browser communicates with a Web Server, Internet, Intranet, Extranet, WWW, URL

**Introduction to HTML:** Structure of an HTML program, Paragraph Breaks, Line Breaks; Emphasizing Material in a Web Page (Heading Styles, Drawing Lines); Text Styles (Bold, Italics, Underline); Other Text Effects (Centering (Text, Images etc.) ; **Lists:** Unordered List, Ordered Lists, Definition lists; **Adding Images:** Img element using Border, Width, Height, Align, ALT Attributes; **Tables:** Caption Tag, Width, Border, Cell padding, Cell spacing, BGCOLOR, COLSPAN and ROWSPAN Attribute

**UNIT - II**

**Linking Documents:** Anchor tag, External Document References, Internal Document References and Image Maps

**Frames:** understanding frames, creating frames, Targeting Named Frames

**Cascading style sheets (CSS):** Style tag, Link tag, Types of CSS: In-Line, Internal, External

**Forms:** Attributes of Form element, Input element: Text Element, Password, Button, Submit Button, Reset Button, The Checkbox, Radio, TextArea, Select and Option

**UNIT - III**

**Java Script:** Features, tokens, data types, variables, operations, control constructs, strings arrays, functions, core language objects, client side objects, event handling. Applications related to client side form validation

**Other Built-In Objects in JavaScript:** The String Object, The Math Object, and The Date Object; User Defined Objects: Creating a User Defined Object, Instances, Objects within Objects

**UNIT - IV**

**Creating WebPages using Dreamweaver:** Introduction to Dreamweaver, Understanding Workspace Layout, Managing Websites, Creating a Website, Using Dreamweaver Templates, Adding New WebPages, Text and Page Format, Inserting Tables, Lists, Images, Adding Links.

**Suggested Reading:**

<b>Essential :</b>		
1.	Wanger & Wyke	: Java Script Unleashed, Pearson, Latest reprint New Delhi.
2.	Bayross, Ivan	: HTML,DHTML, JAVASCRIPT by BPB, Latest reprint
<b>Further Reading :</b>		
3.	Joseph Lowery	: Adobe Dreamweaver CS6 Bible by Wiley India
4.	Kogent Learning Solutions Inc	Dreamweaver CS5 in Simple Steps by Wiley India

## Paper- PCA03: Practical based on Paper CA05 and CA06

**Total Periods: 60**  
**(6 Periods/week)**

**Max. Marks: 30**  
**Exam Hours: 3**

Write programs in C++ to demonstrate:

- The use of C++ operators, tokens and keywords.
- Input and output statements
- Control statements
- Functions (Function overloading, inline functions, friend functions).
- Classes (Object Declaration, Private and Public members, defining member functions)
- Data hiding and encapsulation
- Static data members and member functions
- arrays within a class, Array of objects
- Objects as function arguments
- Implementation of Constructor and Destructor.
- Operator Overloading (using member function and friend function)
- Inheritance (using visibility modes: Private, public, protected)
- All types of inheritance (multiple, multilevel, hybrid, hierarchical)
- Polymorphism (pointers to objects, Virtual Functions)

Design WebPages using HTML, DHTML, JavaScript, Dreamweaver

- Creating Time-Table of a student using tables
- Creating various lists using list tags
- Preparing Bio-Data using tables, images, formatting tags, lists
- Create a simple website using frames and other features of HTML
- Calculate expression using eval function
- Form Validation Using JavaScript event Handlers and functions
- Web site design using dream weaver

**Note:** Paper will be set at the time of examination. Due weight age may be given to the practical note-book and Assignments in Evaluation.

**FOURTH SEMESTER**  
**Paper CA07: Data structures**

**Total Periods: 60**  
**(6 Periods/week)**

**Max. Marks: 30+5**  
**Exam Hours: 3**

**Objective: The course enables the students to get familiar with the basic concepts of data structures and develop programs using different concepts.**

**Note:**

- i. The Question Paper will consist of Four Units.
- ii. Examiner will set total of **NINE** questions comprising **TWO** questions from each Unit and **ONE** compulsory question of short answer type covering whole syllabi.
- iii. The students are required to attempt **ONE** question from each Unit and the Compulsory question.
- iv. All questions carry equal marks unless specified.

**UNIT - I**

**Basic Concepts:** Introduction to data structure basics and notations, introduction to complexity  
**Arrays:** Introduction, various operations on Arrays like insertion, deletion, searching (Binary and Linear Search) and Sorting (Bubble sort, Insertion sort, Selection sort)

**UNIT - II**

**Linked list:** Introduction, declaration, operations:-traversing, searching, inserting, deleting; Introduction to circular list  
**Stacks:** Array representation of a stack, operations- initialization, push, pop, empty, and full; applications: Expression evaluation, expression conversion, recursion

**UNIT - III**

**Queues:** introduction, memory representation, operations- add, removes, initialization; applications  
**Trees:** Definition and Basic concepts, Linked Tree Representation, Representation in Contiguous Storage, Binary Tree, Binary Tree Traversal, Searching, Insertion and deletion in Binary trees

**UNIT - IV**

**Graphs:** Graphs and their application, Sequential and Linked representation of Graph, Traversing a graph (DFS and BFS).

**References :**

- Lipschultz L. Seymour, 2001 : Data Structure, Schaum Outline Series, TMH, New Delhi.
- Tannenbaum, Aaro M., 1990 : Data Structure Using C, Pearson.

**Suggested Reading:**

<b>Essential :</b>		
1.	Lipschultz L. Seymour	: Data Structure, Schaum Outline Series, TMH, New Delhi.
<b>Further Reading :</b>		
2.	Tannenbaum, Aaro M	: Data Structure Using C, Pearson.
3.	Salaria, R. S.	: Data Structures & Algorithm Using C; Khanna Book Publishing Co. (P.) Ltd., New Delhi.
4.	Sofat Sanjeev	: Data Structure with C and C++, Khanna Book Publishing Co.

## Paper CA08: Java Programming

Total Periods: 60  
(6 Periods/week)

Max. Marks: 30+5  
Exam Hours: 3

**Objective:** The course enables students to understand the basics of DBMS.

**Note:**

- i. The Question Paper will consist of Four Units.
- ii. Examiner will set total of **NINE** questions comprising **TWO** questions from each Unit and **ONE** compulsory question of short answer type covering whole syllabi.
- iii. The students are required to attempt **ONE** question from each Unit and the Compulsory question.
- iv. All questions carry equal marks unless specified.

### UNIT - I

1. **Fundamentals of Java:** Introduction to Java and its features, Java Vs. C++, ByteCode, Java virtual machine, constants, variables, data types, operators, expressions, control structures, defining class, creating objects, accessing class members, constructors, method overloading
2. **Inheritance:** Basics, member access, using super to call super class constructors, creating a multi level hierarchy, method overriding, Dynamic method dispatch, using abstract classes, using Final.

### UNIT - II

3. **Arrays and String handling:** creating and using arrays, understanding string and StringBuffer class and various string functions
4. **Interfaces:** creating and using Interfaces, Implementing inheritance and multiple inheritance using Interfaces.
5. **Packages:** understanding packages and system defined packages, creating and using user defined packages

### UNIT - III

6. **Exception Handling:** Fundamentals, exception types, using Try and catch, Multiple Try and Catch clauses, Nested Try statements, Built –in exceptions.
7. **Multi-threaded Programming:** Understanding Multithreading, Thread Life Cycle, Creating threads using The thread class and runnable Interface, creating Multiple Threads, Resuming and stopping Threads, Thread priorities, synchronizations

### UNIT - IV

8. **Applet fundamentals:** Introduction, Types of applet, Life Cycle, Incorporating an applet into web page using Applet Tag, running applets; using Graphics class and its methods to draw lines, rectangles, circles, ellipses, arcs and polygons

### **Suggested Reading:**

Essential :		
1.	Balaguruswamy, E.	: Programming with Java, A Primer, TMH, New Delhi, Latest reprint
Further Reading :		
2.	Liang, Daniel	: An Introduction to Java Programming, PHI, New Delhi, Pearson, Latest reprint
3.	Bayross, Ivan	: Java 2 by BPB publication
4.	Schildt , Herbert	: The Complete Reference Java 2, TMH, Latest reprint
5.	Arora, Indu	: JAVA Programming

**Paper –PCA04: Practical based on CA07 and CA08**

**Total Periods: 60**  
**(6 Periods/week)**

**Max. Marks: 30**  
**Exam Hours: 3**

Write programs in C++ to demonstrate:

- the operations on various data structures.**

Write programs in Java to demonstrate:

- Implementation of Classes and Objects
- Constructors and their types
- Inheritance – calling super class constructors, abstract classes, multilevel hierarchy
- Method overloading and overriding
- String handling
- Creating Packages and Interfaces: Defining an Interface, Importing packages
- Implementation and handling of built-in and user defined exceptions
- I/O streams
- Applet programming

**Note:** Paper will be set at the time of examination. Due weight age may be given to the practical note-book and Assignments in Evaluation.

**FIFTH SEMESTER**

**Paper-CA09: Programming with VB.NET**

**Total Periods: 60**  
**(6 Periods/week)**

**Max. Marks: 30+5**  
**Exam Hours: 3**

**Note :**

- i. The Question Paper will consist of Four Sections.
- ii. Examiner will set total of **NINE** questions comprising **TWO** questions from each Section and **ONE** compulsory question of short answer type covering whole syllabi.
- iii. The students are required to attempt **ONE** question from each Section and the Compulsory question.
- iv. All questions carry equal marks unless specified.

**Objective: The course is designed to enable the students to develop applications using event driven programming with VB.net.**

**UNIT - I**

**Overview of the Visual Studio .NET IDE:** Introduction to .NET Framework and the Common Language Runtime, Introduction to Visual Studio.NET IDE: Menu Bar and Tool Bar, Design Window, Code Editor, Server Explorer, Solution Explorer, Toolbox, Properties Window, Object Browser, Class view Window, Working with windows forms and events, Adding different controls of Toolbox (Text Box, Label, Check Box, Radio Button, Button, Frame, List Box, Combo Box, Picture Box, Progress Bar, Timer) to Forms , Setting their Tab orders, enabling and disabling controls

**UNIT - II**

**Basics of VB.Net:** Constants, Variables, data types, Operators: Arithmetic, Concatenation, Comparison, logical operators, and assignment operators, Control structures: If, if/then/else selection structures, Select case Multiple-selection structure, While, do while, do until, For/Next, For each repetition structure

### UNIT - III

**Procedures:** Introduction, sub Procedures, function procedures, event procedures, commonly used Form events, creating message boxes, input boxes and dialog boxes

**Arrays and Strings:** declaring and allocating Arrays, Using Strings and String functions: len, right, left, ucase, lcase, ltrim, trim

**Designing Menus:** The MenuStrip control and ToolStripMenuItem objects, working with Multiple Forms, Setting the Startup Form

### UNIT - IV

**Working with Data and ADO.NET:** Understanding ADO.net Object model, components, Basic operations in ADO.net, Data Reader, Data Adapter and Data sets, connecting to and querying a data source, Using Data Grid view for viewing the records from tables.

### **References:**

1	Visual Basic.NETHowto Program	:	Deitel, Pearson Education, Low Price Edition3
2.	Visual Basic 2008 in simple steps	:	KoGent Solutions Inc., dreamTech Press
3.	Sams Teach Yourself more Visual Basic.net in 21 days	:	Lowell Mauer

## Paper CA10: Database Management using Oracle

**Total Periods: 60**  
**(6 Periods/week)**

**Max. Marks: 30+5**  
**Exam Hours: 3**

### Note :

- i. The Question Paper will consist of Four Sections.
- ii. Examiner will set total of **NINE** questions comprising **TWO** questions from each Section and **ONE** compulsory question of short answer type covering whole syllabi.
- iii. The students are required to attempt **ONE** question from each Section and the Compulsory question.
- iv. All questions carry equal marks unless specified.

**Objective: The course is designed to enable the students to understand basic database concepts and managing database using SQL queries.**

### UNIT - I

**Database Concepts:** Introduction to databases, need, database architecture, Terminology: Tuple, Degree, attributes, Domain, Primary key, Foreign keys, candidate keys; The 12 Rules (Codd's Rule) for an RDBMS, Normalization: First, second and third Normal Form, Boyce Codd Normal Form

### UNIT - II

**Understanding SQL-I:** Data Types, Creating Tables, Creating a Table with data from Another table, Inserting Values into a Table, Updating Column(s) of a Table, Deleting Row(s) from a Table, Dropping a Column, Querying database tables, Conditional retrieval of rows, Working with Null Values, Matching a pattern from a table, ordering the result of a Query Aggregate Functions, Grouping the Result of a Query, creation and deletion of Views

### UNIT - III

**Understanding SQL-II:** Managing privileges with Grant and Revoke Command, COMMIT and ROLLBACK, Functions: Arithmetic Functions, Character Functions, Date Functions, Group Functions, Querying Multiple Tables using Equi-Joins, Cartesian Joins, Outer Joins, Self-Joins, SET Operators: Union, Intersect, Minus; Introduction to Nested Queries

### UNIT - IV

**PL/SQL:** Introduction to PL/SQL, The Advantage of PL/SQL, PL/SQL Block Structure, PL/SQL Architecture, Fundamentals of PL/SQL, PL/SQL Data Types, Variables and Constants, Scope and Visibility of a Variable, Assignments and Expressions, Operator Precedence, Conditional and Iterative Control, Cursor Management in PL/SQL, Implicit/explicit Cursor Attributes, Exception Handling in PL/SQL; Predefined Exceptions, User Defined Exceptions.

### References:

1	Introduction to Database Systems	:	C.J.Date
2	Database System Concepts	:	Korth
3	Anurag Gupta	:	Database Concepts



**Paper PCA05: Practical Based on CA09 and CA10**

**Total Periods: 60**  
**(6 Periods/week)**

**Max. Marks: 30**  
**Exam Hours: 3**

- Development of programs using VB.Net
  - Use Controls to create User Interface, Connect with database and navigate between records of a Table; Create applications which can Insert, Delete, and Update data in a database using SQL statements
- Practice of SQL and PL/SQL Commands
  - DDL Commands: Create, Rename, Alter, delete Tables, views
  - DML Commands: All variations of Select, Conditional retrieval of rows, Working with Null
  
  - Joins: Equi-Joins, Outer Joins, Self-Joins
  - Set operators : Union, Intersect, Minus
  - Functions: Character, Date and Group Functions.
  - COMMIT and ROLLBACK, Grant and Revoke Command

**Sixth Semester**  
**Paper CA11: Computer Networks**

**Total Periods: 60**  
**(6 Periods/week)**

**Max. Marks: 30+5**  
**Exam Hours: 3**

**Note:**

- i. The Question Paper will consist of Four Sections.
- ii. Examiner will set total of **NINE** questions comprising **TWO** questions from each Section and **ONE** compulsory question of short answer type covering whole syllabi.
- iii. The students are required to attempt **ONE** question from each Section and the Compulsory question.
- iv. All questions carry equal marks unless specified.

**Objective: The course enables students to understand the basics of Computer Networks. UNIT - I**

**Introduction to Computer networks and applications:** Network Structure and Architecture, Network Hardware and Software (protocol hierarchies, design issues for layers, interfaces and services: connection oriented and connection less), Network structure and architecture-point to point, multicast, broadcast, Classification of networks on the basis of Geographical Span (PAN, LAN, MAN and WAN) , LAN topologies(Bus, Ring, Star, Mesh, Tree and Hybrid).

**Network Connecting Devices:** Repeaters, Hubs, Bridges, Routers, Gateways and Switches

**Introduction to Data Communication:** Analog Signal, Digital Signal, Analog vs Digital Communication

**UNIT - II**

**Network models:** OSI reference model, TCP/IP model and their Comparison.

**Physical Layer:** Types of Transmission media, Guided (Twisted-pair, Coaxial and Optical fiber) and Unguided (Radio, Microwave and infrared), Switching: Circuit switching, Packet Switching, Message Switching, modems, Modulation techniques: AM, PM, FM; Multiplexing Techniques: definition and Types.

**UNIT - III**

**The Data Link Layer:** Design Issues, Error Detection and Correction: Nature of errors, Parity Check, checksum, CRC, Hamming Code, Elementary Data Link Protocols: Simplex. Stop and Wait Protocol, Sliding Windows Protocol: one Bit sliding windows protocol, go back n, selective repeat, HDLC: High Level Data Link Protocol.

**UNIT - IV**

The Network Layer: Design Issues, Routing Algorithms (Shortest Path, Flooding, Flow Based, Distance Vector, Link State, Broadcast), Congestion Control Algorithms and their general principles (Leaky Bucket, Token Bucket)

**References :**

1.	Tanenbaum, Andrew S.	:	"Computer Networks", PHI.
2.	Behrouz A. Forouzan	:	"Data Communication & Networking", TMH
3.	Stalling William Maxwell	:	"Data and Computer Communication", Macmillan International edition.
4.	McGoven, Tom	:	"Data Communication: Concepts & Applications", (Prentice Hall).

## Paper CA12: Working with Linux

**Total Periods: 60**  
**(6 Periods/week)**

**Max. Marks: 30+5**  
**Exam Hours: 3**

**Note:**

- i. The Question Paper will consist of Four Sections.
- ii. Examiner will set total of **NINE** questions comprising **TWO** questions from each Section and **ONE** compulsory question of short answer type covering whole syllabi.
- iii. The students are required to attempt **ONE** question from each Section and the Compulsory question.
- iv. All questions carry equal marks unless specified.

**Objective: The course enables the students to get familiar with LINUX Operating system.**

### UNIT - I

**Introduction to Linux:** Kernel, Linux's shell, Features of Linux, History, Minimum system requirements, Boot and Root disks , Starting and stopping Linux system, passwords, logging in and out, terminal Handling commands: who, Understanding wildcards, Environment variables, Understanding I/O Redirection and Piping: Introduction, cut, paste, sort, tee; Introduction to Regular Expressions and grep, Process Management: Types of processes, managing processes with ps, bg, fg, nice, kill

### UNIT - II

**Using file system:** Introduction to common types of files, Filenames, Introduction to different types of directories: Parent, Subdirectory, Home directory; rules to name a directory, understanding Important directories in Linux File System, Absolute and relative filenames, creating and using files and directories(mkdir, cd cat), listing files (ls, ls-l), pwd, moving and copying files and directories (mv, cp), Removing files and directories(rm, rmdir), using wildcards with files and directories, File and directory permissions using relative and absolute methods, Changing group ownership, umask settings

### UNIT - III

**Vi editor:** starting vi, vi modes, inserting text, quitting vi, deleting text, copying and moving text, searching and replacing text

**Introduction to shell programming:** Defining Variables, Unsetting Variables, Environment Variables, Substitution, Filename Substitution (Globbing), Variable Substitution, Command and Arithmetic Substitution, Quoting , Quoting with Backslashes, Using Single Quotes, Using Double Quotes, Quoting Rules and Situations, The if Statement, The case Statement, The while Loop, The for and select Loops, Loop Control

### UNIT - IV

**Understanding System Administration activities:** Superuser (su) command, Taking backups using tar, Managing disk space with df and du, Mounting and Un-mounting file system with mount and unmount, Managing users

**References::**

- Tim Parker, Linux Unleashed Third Edition, Techmedia, BPB
- Sams Teach Yourself Shell Programming in 24 Hours
- Norton, P., Complete guide to LINUX, Techmedia
- John Goerzen: Linux Programming Bible, IDG Books, New Delhi

**Paper PCA06: Practical based on CA12**

**Total Periods: 60  
(6 Periods/week)**

**Max. Marks: 30  
Exam Hours: 3**

- Practically executing Linux commands  
Write simple shell programs.**