

# **ANNA ADARSH COLLEGE FOR WOMEN**

## **Department of BCA – Shift II**

**Academic year : 2020 - 2021**

### **Course Objective:**

- ❖ Provide strong foundations in fundamentals of Computer Science and applications; interdisciplinary courses and electives for widening the domain expertise.
- ❖ Design and develop software based solutions for real world problems, serving effectively to the requirements of computer field and Society
- ❖ Attain sufficient knowledge related to computer domains, possesses technical, soft and hard skills and apply them effectively in team work
- ❖ Empower the students with competencies in creative thinking and problem solving, interpersonal communication and managerial skills.

### **Course Outcome:**

- ❖ After Completion of the course, the students are expected to understand the basic principles and concepts of Computer applications and integrate the knowledge gained in Computer application domain with practical needs of the society and be an ethically and socially responsible Computer Application Professional.
- ❖ Explore emerging technologies in diverse areas of Computer Application and inculcate skills for successful career, entrepreneurship and higher studies.
- ❖ Ability to apply the concepts of Computer and practices via emerging technologies and Software development tools.

# **SEMESTER I**

## **New syllabus effective from 2020**

**YEAR : I**

**Name of the Subject: Problem Solving using Python**

**Subject Code: SE21A**

### **Learning Objectives:**

- ❖ Describe the core syntax and semantics of Python programming language.
- ❖ Discover the need for working with the strings and functions.
- ❖ Illustrate the process of structuring the data using lists, dictionaries, tuples and sets.
- ❖ Understand the turtle graphics concept
- ❖ Understand the usage of packages and Dictionaries.

### **Syllabus :**

**UNIT – I**: Introduction: The essence of computational problem solving – Limits of computational problem solving-Computer algorithms-Computer Hardware-Computer Software-The process of computational problem solving-Python programming language - Literals - Variables and Identifiers - Operators - Expressions and Data types.

**UNIT - II**: Control Structures: Boolean Expressions - Selection Control - If Statement- Indentation in Python- Multi-Way Selection -- Iterative Control- While Statement- Infinite loops- Definite vs. Indefinite Loops- Boolean Flags and Indefinite Loops. Lists: List Structures - Lists in Python - Iterating over lists in Python.

**UNIT - III**: Functions: Program Routines- Defining Functions- More on Functions: Calling Value-Returning Functions Calling Non-Value-Returning Functions- Parameter Passing - Keyword Arguments in Python - Default Arguments in Python-Variable Scope.

**UNIT - IV**: Objects and their use: Software Objects - Turtle Graphics – Turtle attributes- Modular Design: Modules - TopDown Design - Python Modules - Text Files: Opening, reading and writing text files - String Processing - Exception Handling.

**UNIT - V:** Dictionaries and Sets: Dictionary type in Python - Set Data type. Object Oriented Programming using Python: Encapsulation - Inheritance – Polymorphism. Recursion: Recursive Functions.

**Learning Outcome:**

- To understand the principles of Python and acquire skills in programming in Python.
- To develop the emerging applications of relevant field using Python.
- Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.
- Able to develop simple turtle graphics programs in Python.

**Text Books:**

1. Charles Dierbach, “Introduction to Computer Science using Python - A computational Problem solving Focus”, Wiley India Edition, 2015.

**Reference Books:**

1. Mark Lutz, “Learning Python Powerful Object Oriented Programming”, O’reilly Media 2018, 5th Edition.

2. Timothy A. Budd, “Exploring Python”, Tata MCGraw Hill Education Private Limited 2011, 1st Edition.

3. Allen Downey, Jeffrey Elkner, Chris Meyers, “How to think like a computer scientist: learning with Python”, 2012.

4. SheetalTaneja& Naveen kumar, “Python Programming a Modular approach – A Modular approach with Graphics, Database, Mobile and Web applications”, Pearson, 2017.

5. ChSatyanarayana M Radhika Mani, B N Jagadesh, “Python programming”, Universities Press 2018.

# **SEMESTER I**

## **New Syllabus(Effective from 2020 to 2021)**

**YEAR : I**

**Name of the Subject : Practical I / Python Programming Lab**

**Subject Code : SE211**

### **Learning Objectives:**

- ❖ To implement the python programming features in practical applications.
- ❖ To write, test, and debug simple Python programs.
- ❖ To implement Python programs with conditionals and loops.
- ❖ Use functions for structuring Python programs.
- ❖ Represent compound data using Python lists, tuples, dictionaries , turtles, Files and modules.

### **Syllabus :**

1. Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2. Program to calculate total marks, percentage and grade of a student. Marks obtained in each of the five subjects are to be input by user. Assign grades according to the following criteria:
  - Grade A: Percentage  $\geq 80$
  - Grade B: Percentage  $\geq 70$  and  $< 80$
  - Grade C: Percentage  $\geq 60$  and  $< 70$
  - Grade D: Percentage  $\geq 40$  and  $< 60$
  - Grade E: Percentage  $< 40$
3. Program, to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
4. Program to display the first n terms of Fibonacci series.
5. Program to find factorial of the given number using recursive function.
6. Write a Python program to count the number of even and odd numbers from array of N numbers.

7. Python function that accepts a string and calculate the number of upper case letters and lower case letters.
8. Python program to reverse a given string and check whether the give string is palindrome or not.
9. Write a program to find sum of all items in a dictionary.
10. Write a Python program to construct the following pattern, using a nested loop  
1  
22  
333  
4444  
55555  
666666  
7777777  
88888888  
999999999
11. Read a file content and copy only the contents at odd lines into a new file.
12. Create a Turtle graphics window with specific size.
13. Write a Python program for Towers of Hanoi using recursion
14. Create a menu driven Python program with a dictionary for words and their meanings.
15. Devise a Python program to implement the Hangman Game.

**Learning Outcome:**

- Understand the numeric or real life application problems and solve them
- Apply a solution clearly and accurately in a program using Python.
- Apply the best features available in Python to solve the situational problems.

**SEMESTER II**  
**New syllabus**  
**(effective from 2020-2021)**

**YEAR : I**

**Name of the Subject : Object Oriented Programming Concepts using C ++**

**Subject Code : SU22A**

**Learning Objectives :**

- ❖ To inculcate knowledge on Object-oriented programming concepts using C++.
- ❖ To gain Knowledge on programming with C++.

**Syllabus :**

**UNIT - I:** Introduction to C++ - key concepts of Object-Oriented Programming – Advantages – Object Oriented Languages – I/O in C++ - C++ Declarations. Control Structures : - Decision Making and Statements : If ..else, jump, goto, break, continue, Switch case statements - Loops in C++ : for, while, do - functions in C++ - inline functions – Function Overloading.

**UNIT - II:** Classes and Objects: Declaring Objects – Defining Member Functions – Static Member variables and functions – array of objects –friend functions – Overloading member functions – Bit fields and classes – Constructor and destructor with static members.

**UNIT- III:** Operator Overloading: Overloading unary, binary operators – Overloading Friend functions – type conversion – Inheritance: Types of Inheritance – Single, Multilevel, Multiple, Hierarchal, Hybrid, Multi path inheritance – Virtual base Classes – Abstract Classes.

**UNIT - IV:** Pointers – Declaration – Pointer to Class , Object – this pointer – Pointers to derived classes and Base classes – Arrays – Characteristics – array of classes – Memory models – new and delete operators – dynamic object – Binding, Polymorphism and Virtual Functions.

**UNIT - V:** Files – File stream classes – file modes – Sequential Read / Write operations – Binary and ASCII Files – Random Access Operation – Templates – Exception Handling - String – Declaring and Initializing string objects – String Attributes – Miscellaneous functions .

**Learning Outcome:**

- To write programs using OOP concepts like Abstraction, Encapsulation, Inheritance and Polymorphism
- Analyze, write, debug, and test basic C++ codes
- Illustrate the process of data file manipulations using C++

**Text Books:**

1. E. Balagurusamy, “Object-Oriented Programming with C++”, TMH 2013, 7th Edition.

**Reference Books:**

1. Ashok N Kamthane, “Object-Oriented Programming with ANSI and Turbo C++”, Pearson Education 2003.
2. Maria Litvin& Gray Litvin, “C++ for you”, Vikas publication 2002.

## **SEMESTER II**

### **New Syllabus(Effective from 2020 - 2021)**

**YEAR : I**

**Name of the Subject : Practical II / C++ Programming Lab**

**Subject Code : SU221**

**Learning Objectives :**

- ❖ To implement the various object oriented programming concepts using C++

**Syllabus:**

1. Write a C++ program to demonstrate function overloading, Default Arguments and Inline function.
2. Write a C++ program to demonstrate Class and Objects
3. Write a C++ program to demonstrate the concept of Passing Objects to Functions
4. Write a C++ program to demonstrate the Friend Functions.
5. Write a C++ program to demonstrate the concept of Passing Objects to Functions
6. Write a C++ program to demonstrate Constructor and Destructor

7. Write a C++ program to demonstrate Unary Operator Overloading
8. Write a C++ program to demonstrate Binary Operator Overloading
9. Write a C++ program to demonstrate:
  - Single Inheritance
  - Multilevel Inheritance
  - Multiple Inheritance
  - Hierarchical Inheritance
  - Hybrid Inheritance
10. Write a C++ program to demonstrate Virtual Functions.
11. Write a C++ program to manipulate a Text File.
12. Write a C++ program to perform Sequential I/O Operations on a file.
13. Write a C++ program to find the Biggest Number using Command Line Arguments
14. Write a C++ program to demonstrate Class Template
15. Write a C++ program to demonstrate Function Template.
16. Write a C++ program to demonstrate Exception Handling.

**Learning Outcome:**

- To understand the structure and model of the C++ programming language.
- To solve problems in C++ demonstrating Object Oriented Concepts.

**ANNA ADARSH COLLEGE FOR WOMEN**  
**Department of BCA – Shift II**

**Academic year : 2020– 2021 and Prior**

**SEMESTER III**  
**Old Syllabus(Effective from 2010 to 2020)**

**YEAR : II (Old Syllabus)**

**Name of the Subject : Programming in C++ and Data structures**

**Subject Code : SAZ3A**

**Learning Objectives :**

- ❖ To understand object-oriented programming concept
- ❖ To understand ADTs, Stack, Queue, Linked List, Trees and Graphs
- ❖ To introduce the fundamental concept of data structures and to emphasize the importance of data structures in developing and implementing efficient algorithms.

**Syllabus :**

**UNIT - I:** Introduction to C++; Tokens, Keywords, Identifiers, Variables, Operators, Manipulators, Expressions and Control Structures in C++; Pointers - Functions in C++ Main Function, Function Prototyping Parameters Passing in Functions - Values Return by Functions - Inline Functions - Friend and Virtual Functions

**UNIT-II:** Classes and Objects; Constructors and Destructors; and Operator Overloading and Type Conversions - Type of Constructors - Function overloading. Inheritance : Single Inheritance Multilevel Inheritance Multiple Inheritance Hierarchical Inheritance Hybrid Inheritance. Pointers, Virtual Functions and Polymorphism; Managing Console I/O operations.

**Unit - III:**Working with Files: Classes for File Stream Operations Opening and Closing a File EndOfFile Deduction File Pointers Updating a File Error Handling during File Operations Command Line Arguments. Data Structures: Definition of a Data structure primitive and composite Data Types, Asymptotic notations, Arrays, Operations on Arrays, Order lists.

**UNIT - IV:**Stacks - Applications of Stack Infix to Postfix Conversion, Recursion, Maze Problems - Queues Operations on Queues, Queue Applications, Circular Queue. Singly Linked List Operations, Application Representation of a Polynomial, Polynomial Addition; Doubly Linked List Operations, Applications.

**UNIT - V :**Trees and Graphs: Binary Trees Conversion of Forest to BinaryTree, Operations Tree Traversals; Graph Definition, Types of Graphs,Hashing Tables and Hashing Functions, Traversal Shortest Path;Dijkstra's Algorithm.

### **Learning Outcome:**

- To write programs using OOP concepts like Abstraction, Encapsulation, Inheritance and Polymorphism.
- Understand the File concept and how to handle exceptions.
- Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms.
- Demonstrate different methods for traversing trees.

### **Text Books:**

1. E. Balagurusamy,1995,Object Oriented Programming with C++, Tata McGrawHill Publishing Company Ltd.
2. E.Horowitz and S.Shani,1999,Fundamentals of Data Structures in C++ , Galgotia Pub.

### **Reference Books:**

1. Robert Lafore, Object Oriented Programming in Microsoft C++, Galgotia publication.
2. H.Schildt, C++,1998,The Complete Reference-1998-TMH Edition, 1998
3. R. Kruse C.L. Tondo and B. Leung ,1997, Data Structures and Program design in C,PHI.
4. Cangsam,Augenstein,Tenenbaum,Data Structures using C & C++,PHI
5. D.Samantha, 2005, Classic Data Structures, PHI, New Delhi.

## **SEMESTER III**

**YEAR : II (Old Syllabus)**

**Name of the Subject : Microprocessor & Its Applications**

**Subject code : SAZ3B**

### **Learning Objectives :**

- ❖ To introduce architecture and operations of 8085 microprocessor

### **Syllabus :**

**UNIT 1:** Introduction to microcomputers-microprocessor and assembly languages-microprocessor architecture and its operations-8085 MPU-8085 instruction set and classifications

**UNIT 2:** Writing assembly level programs-programming techniques such as looping-counting and indexing addressing modes-data transfer instructions-arithmetic and logic operations-dynamic debugging

**UNIT 3:**Counters and time delays-hexadecimal counter modulo 10 counter-pulse timings for flashing lights-debugging counter and time delay program-stack-subroutine-conditional call and return instructions

**UNIT 4:** BCD to binary and binary to BCD conversions-BCD to HEX and HEX to BCD conversions-ASCII to BCD to ASCII conversions-BCD to seven segment LED code conversions-binary to ASCII and ASCII to binary conversions-multi byte addition-multi byte subtraction-BCD addition-BCD subtraction-multiplication and division

**UNIT 5:**Interrupt-implementing interrupts-multiple interrupt 8085-trap- problems on implementing 8085 interrupt-DMA memory interfaces-RAM & ROM –I/O interface-direct I/O memory mapped I/O.

### **Learning Outcome:**

- To write program in assembly language.

- Demonstrate different categories of addressing modes .
- Understand different types of instruction Set, Memory types.
- Concept of Interrupts and its type, DMA.

**Text Books:**

1 R.S.Ganokar-1990-Microprocessor architecture-Programming and Application with 8085/8080A-Wiley Eastern Limited.

2. A.Mathur-1993-Introduction to Microprocessor-3 rd Edition-Tata McGraw Hill.

## **SEMESTER III**

### **Old Syllabus(Effective from 2010 to 2020)**

**YEAR : II**

**Name of the Subject : Numerical and Statistical Methods**

**Subject Code : SAZ3C**

**Learning Objectives :**

- This course introduces the concepts of Numerical Analysis and Statistical Methods

**Syllabus :**

**UNIT-1:** Introduction- Mathematical Preliminaries- Errors: Computations, Formula - Errors in a Series Approximation- Roots of Equations- Linear Equations: Bisection , False Position Methods- Newton-Raphson Method- Secant Method- Muller’s Method- Lin-Bairstow’s Method- Simultaneous Linear Equations: Matrix Inversion Method- Gauss Elimination, Gauss-Jordan, LU Decomposition Methods- Gauss-Seidel Method.

**UNIT-2:** Numerical Differentiation- Errors in Numerical Differentiation- Cubic Spline Method- Numerical Integration- Trapezoidal Rule- Simpson’s 1/3 and 3/8 Rules- Romberg Integration- Ordinary Differential Equations- Taylor’s Series Method- Euler’s Method- Runge-Kutta 2<sup>nd</sup> and 4<sup>th</sup> Order Methods-Predictor-Corrector Methods.

**UNIT-3:** Sampling- Frequency Distribution- Cumulative Frequency Function- Grouped Sample- Measures of Central Tendency: Mean, Median and Mode- Geometric Mean- Harmonic Mean – Dispersion: Range, Mean Deviation, Variance and Standard Deviation Moments- Computation of Moments

**UNIT-4:** Probability- Characteristics: Addition, Multiplication and Conditional Probability Laws- Discrete Distributions: Random Variable- Density and Distribution Functions.- Binomial Distribution- Poisson Distribution- Hypergeometric Distribution- Mathematical Expectation.

**UNIT-5 :** Correlation and Regression Analysis: Linear Least Squares Fit- Nonlinear Fit- Fitting a Polynomial Function- Coefficient of Correlation- Properties- Multiple Correlation – Partial Correlation- Rank Correlation- Tests of Significance- Chi square Test- Goodness of Fit, Algorithm and Analysis of Contingency Tables-  $t$ -Test and F-Test.

**Learning Outcome :**

- Learn the concepts of Numerical Analysis and Statistical Methods

**Text Books :**

**Recommended Texts**

1. S.S.Sastry, 2005, Introductory Methods of Numerical Analysis, 4<sup>th</sup> Edition, Prentice-Hall of India Pvt. Ltd..
- 2.E.Balagurusamy , 2000, Computer Oriented Statistical and Numerical Methods- Macmillan India Ltd.

**Reference Books**

1. V. Rajaraman, 2005, Computer Oriented Numerical Methods, 3<sup>rd</sup> Edition, Prentice- Hall of India Pvt. Ltd..
2. K. S. Trivedi, 2005, Probability and Statistics with Reliability, Queuing and Computer Science Applications, Prentice-Hall of India Pvt. Ltd.
- 3.E. Balagurusamy,1999, Numerical Methods, Tata McGraw-Hill Publishing Co. Ltd..
4. P. Niyogi, 2003, Numerical Analysis and Algorithms, Tata McGraw-Hill Publishing Co. Ltd..

## **SEMESTER : III**

**YEAR : II (Old Syllabus)**

**Name of the Subject : Practical III / Programming in C++ using Data Structures**

**Subject Code : SAZ31**

### **Learning Objectives :**

- This course deals with practical implementation of Data Structure using C++.

### **Syllabus :**

1. Implement PUSH, POP operations of stack using Arrays.
2. Implement PUSH, POP operations of stack using Pointers.
3. Implement add, delete operations of a queue using Arrays.
4. Implement add, delete operations of a queue using Pointers.
5. Conversion of infix to postfix using stack operations
6. Postfix Expression Evaluation.
7. Addition of two polynomials using Arrays and Pointers.
8. Creation, insertion, and deletion in doubly linked list.
9. Binary tree traversals (in-order, pre-order, and post-order) using linked list.
10. Depth First Search and Breadth first Search for Graphs using Recursion.

### **Learning Objectives :**

- To solve problems in C++ demonstrating Object Oriented Concepts.
- Write functions to implement linear and non-linear data structure operations.
- Suggest appropriate linear and non-linear data structure operations for solving a given problem.

# SEMESTER : IV

**YEAR : II (Old Syllabus)**

**Name of the Subject : Programming in Java**

**Subject Code : SAZ4A**

## **Learning Objectives :**

- ❖ This course introduces the basic concepts of programming in JAVA

## **Syllabus :**

**UNIT- I:** Introduction to Java-Features of Java-Basic Concepts of Object Oriented Programming-Java Tokens-Java Statements-Constants-Variables-Data Types- Type Casting-Operators-Expressions-Control Statements: Branching and Looping Statements.

**UNIT - II:**Classes, Objects and Methods - Constructors - Methods Overloading-Inheritance-Overriding Methods - Finalizer and Abstract Methods-Visibility Control – Arrays, Strings and Vectors-StringBuffer Class-Wrapper Classes

**UNIT - III:**Interfaces-Packages-Creating Packages-Accessing a Package-Multithreaded Programming-Creating Threads-Stopping and Blocking a Thread-Life Cycle of a Thread-Using Thread Methods-Thread Priority- Synchronization-Implementing the Runnable Interface

**UNIT - IV:**Managing Errors and Exceptions-Syntax of Exception Handling Code-Using Finally Statement-Throwing Our Own Exceptions-Applet Programming-Applet Life Cycle-Graphics Programming-Managing Input/Output Files: Concept of Streams-Stream Classes-Byte Stream Classes-Character Stream Classes – Using Streams-Using the File Class-Creation of Files-Random Access Files-Other Stream Classes.

**UNIT - V :**Network basics –socket programming – proxy servers – TCP/IP – Net Address – URL – Datagrams -Java Utility Classes-Introducing the AWT: Working with Windows, Graphics and Text- AWT Classes- Working with Frames-Working with Graphics-Working with Color- Working with Fonts-Using AWT Controls, Layout Managers and Menus.

## **Learning Outcome:**

- The various concepts on working of operating system will be learnt
- The memory management, process management systems will be learnt
- Concepts of Deadlock, batch processing etc will be learnt

### **Text Books:**

1. E. Balagurusamy, 2004, Programming with JAVA-2nd Edition, Tata McGraw- Hill Publishing Co. Ltd, New Delhi.
2. Herbert Schildt, The Complete Reference Java TM, 2- 5th Edition, Tata McGraw-Hill Publishing Co. Ltd, New Delhi.

### **Reference Books**

1. Y. Daniel Liang, 2003, An Introduction to JAVA Programming, Prentice-Hall of India Pvt. Ltd.
2. Cay S. Horstmann and Gary Cornell, 2005, Core Java TM 2 Volume I, Fundamental 7th Edition, Pearson Education.

## **SEMESTER : IV**

**YEAR : II (Old Syllabus)**

**Name of the Subject : \_Operating Systems**

**Subject Code : SAZ4B**

### **Learning Objectives :**

- ❖ This course introduces the functions of operating systems.

### **Syllabus :**

**UNIT- I :**Introduction: Views –Goals –Types of system – OS Structure –Components – Services - System Structures – Layered Approach - Virtual Machines - System Design and Implementation. Process Management: Process - Process Scheduling – Cooperating Process –Threads – Interprocess Communication. CPU Scheduling : CPU Schedulers – Scheduling criteria – Scheduling Algorithms

**UNIT-II :**Process Synchronization: Critical-Section problem - Synchronization Hardware – Semaphores – Classic Problems of Synchronization – Critical Region – Monitors. Deadlock : Characterization – Methods for handling Deadlocks – Prevention, Avoidance, and Detection of Deadlock - Recovery from deadlock.

**UNIT-III :** Memory Management : Address Binding – Dynamic Loading and Linking – Overlays – Logical and Physical Address Space - Contiguous Allocation – Internal & External Fragmentation . Non Contiguous Allocation: Paging and Segmentation schemes –Implementation – Hardware Protection – Sharing - Fragmentation.

**UNIT-IV:**Virtual Memory: Demand Paging – Page Replacement – PageReplacement Algorithms – Thrashing. – File System: Concepts – Access methods – Directory Structure –Protection Consistency Semantics – File System Structures – Allocation methods – Free Space Management.

**UNIT-V :**I/O Systems: Overview - I/O Hardware – Application I/O Interface – Kernel I/O subsystem – Transforming I/O Requests to Hardware Operations – Performance. Secondary Storage Structures : Protection – Goals- Domain Access matrix – The security problem –Authentication – Threats – Threat Monitoring – Encryption.

**Learning Outcome:**

- The various concepts on working of operating system will be learnt
- The memory management, process management systems will be learnt
- Concepts of Deadlock, batch processing etc will be learnt

**Text Books:**

1.Silberschatz A., Galvin P.B., Gange, 2002 , Operating System Principles ,Sixth Edition, John Wiley & Sons.

**Reference Books**

1. H.M. Deitel, 1990, An Introduction to Operating System,- Second Edition, Addison Wesley.

## **SEMESTER : IV**

**YEAR : II (Old Syllabus)**

**Name of the Subject : Computer Graphics**

**Subject Code : SAZ4C**

**Learning Objectives :**

- ❖ This course introduces the concepts of Computer Graphics.

**Syllabus :**

**UNIT-1:**Brief Survey of Computer Graphics – Graphics Systems: VideoDisplay Devices – Types – Raster-Scan Systems and Random-Scan Systems –Input Devices – Hard-Copy Devices – Graphics Software.

**UNIT-2:** Line-Drawing (DDA and Bresenham’s) Algorithms – Circle-Generating (Midpoint) Algorithm – Ellipse-Generating (Midpoint) Algorithms– Area-Filling (Boundary-Fill and Flood-Fill) Algorithms - Line Attributes -Color and Grayscale Levels

– Character Attributes – Inquiry Functions .

**UNIT-3:** TWO-DIMENSIONAL TRANSFORMATIONS AND VIEWING : Basic Transformations - Matrix Representations and Homogeneous Coordinates – Composite Transformations – Other Transformations – Window-to-Viewport Coordinate Transformation – Clipping Algorithms: Cohen-Sutherland Line Clipping and Sutherland- Hodgeman Polygon Clipping – Basic Modeling Concepts – Interactive Input Methods: Logical Classification of Input Devices – Interactive Picture-Construction Techniques.

**UNIT-4:** Three-Dimensional Display Methods: Parallel and Perspective Projections – Depth Cueing - Visible Line and Surface Identification – Polygon Surfaces: Polygon Tables, Plane Equations and Polygon Meshes - Three-Dimensional Transformations: Basic, Other and Composite Transformations.

**UNIT-5 :** Viewing Pipeline and Coordinates – Transformation from World to Viewing Coordinates – Projection Transformations - Matrices - View Volumes- Hidden Surface and Hidden Line Elimination Methods: Back-Face Detection, Depth-Buffer and A-Buffer Methods – -Wireframe Methods.

**Learning Outcome:**

- The working of various types of I/O devices will be learnt.
- The various graphical image processing algorithms will be learnt.

**Text Books:**

1.D.Hearn and M.P. Baker, 2005, Computer Graphics, C Version,2nd Edition, Pearson Education, New Delhi.

**Reference Books**

1. W.M.Newman and R.F.Sproull,1997, 2nd Edition, Principles of Interactive Computer Graphics, Tata McGraw-Hill Publishing Co. Ltd.
- 2 .D.P.Mukherjee, 1999, Fundamentals of Computer Graphics and Multimedia, 1st Edition, Prentice-Hall of India Pvt. Ltd. – 1999.
3. N. Krishnamurthy, 2002, Introduction to Computer Graphics, 1st Edition, Tata McGraw-Hill Publishing Co. Ltd..
- 4.D.F.Rogers, 2001, Procedural Elements for Computer Graphics , 2nd Edition, Tata McGraw-Hill Publishing Co. Ltd..
5. Xiang and R.A. Plastock, 2002, Computer Graphics , Schaum’s Outline Series, Tata McGraw-Hill Publishing Co.

## **SEMESTER : IV**

**YEAR : II (Old Syllabus)**

**Name of the Subject : Practical IV / Programming in Java**

**Subject Code : SAZ41**

### **Learning Objectives :**

- This course introduces the concepts of Java Programming

### **Syllabus :**

#### **APPLICATIONS:**

1. Substring Removal from a String. Use String Buffer Class.
2. Determining the Perimeter and Area of a Triangle. Use Stream Class.
3. Determining the Order of Numbers Generated randomly using Random Class.
4. Usage of Calendar Class and Manipulation.
5. Implementation of Point Class for Image Manipulation.
6. String Manipulation Using Char Array.
7. Database Creation for Storing E-mail Addresses and Manipulation.
8. Usage of Vector Classes.
9. Interfaces and Packages
10. Implementing Thread based Applications and Exception Handling.
11. Application using Synchronization such as Thread based, Class based and Synchronized Statements.
12. Textfiles (copy, display, counting characters, words and lines)
13. Data file creating and processing for electricity billing.
14. Data file creating and processing for telephone billing

#### **APPLETS:**

15. Working with Frames and Various Controls.
16. Working with Dialog Box and Menus.
17. Working with Colors and Fonts.
18. Drawing various shapes using Graphical statements.
19. Working with panel and all types of Layout.
20. Design a simple calculator with minimal of 10 operations
21. Usage of buttons, labels, text components in suitable application
22. Usage of Radio buttons, check box ,choice list in suitable application

### **Learning Outcome :**

- To learn Java programs

# **SEMESTER : V**

**YEAR : III(Old Syllabus)**

**Name of the Subject :Database Management Systems**

**Subject Code : SAZ5A**

## **Learning Objectives :**

- ❖ This course introduces the basic concepts of database management systems

## **Syllabus :**

**UNIT-1:**Advantages and Components of a Database Management Systems – Feasibility Study – Class Diagrams – Data Types – Events –Normal Forms – Integrity – Converting Class Diagrams to Normalized Tables – Data Dictionary.

**UNIT-2:**Query Basics – Computation Using Queries – Subtotals and GROUP BY Command – Queries with Multiple Tables – Sub queries –Joins – DDL & DML – Testing Queries

**UNIT-3:**Effective Design of Forms and Reports – Form Layout –Creating Forms – Graphical Objects – Reports – Procedural Languages –Data on Forms – Programs to Retrieve and Save Data – Error Handling.

**UNIT-4:**Power of Application Structure – User Interface Features –Transaction – Forms Events – Custom Reports – Distributing Application – Table Operations – Data Storage Methods – Storing Data Columns – Data Clustering and Partitioning.

**UNIT-5:** Database Administration – Development Stages – Application Types – Backup and Recovery – Security and Privacy – Distributed Databases – Client/Server Databases – Web as a Client/Server System –Objects – Object Oriented Databases – Integrated Applications.

## **Learning Outcome:**

- The creation, updating and deletion of database will be learnt
- Pictorial representation of Table and Database will be learnt
- Connecting front-end to database

### **Text Books:**

1.G. V. Post – Database Management Systems Designing and Building BusinessApplication – McGraw Hill International edition – 1999.

### **Reference Books**

1.RaghuRamakrishnan – Database Management Systems – WCB/McGraw Hill – 1998.

2.C.J. Date – An Introduction to Database Systems – th Edition – Addison Wesley -2000.

## **SEMESTER : V**

**YEAR : III(Old Syllabus)**

**Name of the Subject : Software Engineering**

**Subject Code : SAZ5B**

### **Learning Objectives :**

- ❖ This course introduces the concepts of Life Cycle of Software

### **Syllabus :**

**UNIT-1:**Introduction to Software Engineering Some definition – Some size factors – Quality and productivity factors – Managerial issue. Planning a Software Project: Defining the problem – Developing a solution strategy – planning the development process

– planning an organization structure – other planning activities

**UNIT-2:**Software Cost Estimation: Software – Cost factors – Software cost estimation techniques – specification techniques – level estimation – estimating software maintenance costs.

**UNIT-3:**Software requirements definition: The software requirements specification – formal languages and processors for requirements specification.

**UNIT-4:**Software Design: Fundamental Design concepts – Modules and modularizing Criteria – Design Notations – Design Techniques –Detailed Design Consideration – Real time and distributed system design – Test plan – Mile stones walk through and inspection –Design guide lines

**UNIT-5 :**Verification and validation techniques: Quality assurance –Static analysis – symbolic exception – Unit testing and Debugging –System testing – Formal verification.

Software maintenance: Enhancing maintainability during development –Managua aspects of software maintenance – Configuration management– source code metrics – other maintenance tools and techniques.

### **Learning Outcome:**

- The significance of Software engineering in Project.
- Steps to design project will be learnt

### **Text Books:**

1. Richard E.Fairly - Software Engineering Concepts - Tata McGraw-Hill book Company.

### **Reference Books**

- 1.R.S.Pressman, 1997, Software Engineering – 1997 - Fourth Ed., McGraw Hill.
- 2.Rajib Mall,2004,Fundamentals of Software Engineering, 2nd Edition, PHI.

## **SEMESTER : V**

**YEAR : III(Old Syllabus)**

**Name of the Subject : Resource Management Techniques**

**Subject Code: SAZ5C**

### **Learning Objectives :**

- ❖ This course introduces the concepts of Resource Management Technique

### **Syllabus :**

**UNIT-1:** Basics of Operations Research (OR): Characteristics of O.R Necessity of O.R in Industry OR and Decision making Role of computers in O.R. Linear programming: Formulations and Graphical solution (of 2 variables) canonical & standard terms of Linear programming problem. Algebraic solution: Simplex method.

**UNIT-2:** Algebraic solution: Charnes method of penalties two phase simplex method concept of Duality properties of duality Dual simplex method.

**UNIT-3:** Transportation model: Definition formulation and solution of transportation models the row minima, column minima, matrix minima and vogels approximation methods. Assignment model: Definition of Assignment model comparison with

transportation model formulation and solution of Assignment model variations of Assignment problem.

**UNIT-4:** Sequencing problem: Processing each of  $n$  jobs through  $m$  machines processing  $n$  jobs through 2 machines processing  $n$  jobs through 3 machines processing 2 jobs through  $m$  machines processing  $n$  jobs through  $m$  machines travelling salesman problem. Game Theory: Characteristics of games Maximin, Minimax criteria of optimality Dominance property algebraic and graphical method of solution of solving  $2 \times 2$  games.

**UNIT-5:** Pert CPM: Networks Fulkersons Rule measure of activity PERT computation CPM computation resource scheduling. Simulation: Various methods of obtaining random numbers for use in computer simulation Additive, multiplicative and mixed types of congruence random number generators Monte Carlo method of simulation its advantages and disadvantages.

**Learning Outcome:**

- Various models for solving different types of resource management will be learnt.
- Applications of RMT in industries will be learnt

**Text Books:**

1. Hamdy A. Taha: ,1996,Operation Research An Introduction, 5th edition, PrenticeHall of India, Pvt. Ltd., New Delhi .
2. Ackoff R.L. and Sasieni M. W, 1968, Fundamentals of Operations Research, JohnWiley and sons, New York.
- 3.Charnes A. Cooper W. and Hendersen A.,1953, Introduction to LinearProgramming, Wiley and Sons, New York.
- 4.Srinath L.S,1973, PERT and CPM principles and applications, Affiliated EastWest Press Pvt. Ltd., New York .

# **SEMESTER : V**

**YEAR : III(Old Syllabus)**

**Name of the Subject : Visual Programming**

**Subject Code : SEZ5A**

## **Learning Objectives :**

- ❖ To inculcate knowledge on Visual Basic concepts and Programming.

## **Syllabus :**

**UNIT 1:**Customizing a Form - Writing Simple Programs - Toolbox -Creating Controls - Name Property - Command Button - Access Keys -Image Controls - Text Boxes - Labels - Message Boxes - Grid – EditingTools - Variables - Data Types - String - Numbers.

**UNIT-2:**Displaying Information - Determinate Loops – Indeterminate Loops - Conditionals - Built-in Functions - Functions and Procedures.

**UNIT 3:**Lists - Arrays - Sorting and Searching - Records - Control Arrays- Combo Boxes - Grid Control - Projects with Multiple forms –DoEvents and Sub Main - Error Trapping.

**UNIT-4:**VB Objects - Dialog Boxes - Common Controls - Menus – MDIForms - Testing, Debugging and Optimization - Working with Graphics.

**UNIT-5:** Monitoring Mouse activity - File Handling - File SystemControls - File System Objects - COM/OLE - automation - DLL Servers- OLE Drag and Drop.

## **Learning Outcome:**

- Front-end designing using Visual Basic will be done.
- Connecting to back-end will also be learnt.

## **Text Books:**

1. Gary Cornell - Visual Basic 6 from the Ground up - Tata McGraw Hill - 1999.
2. Noel Jerke - Visual Basic 6 (The Complete Reference) - Tata McGraw Hill –1999

## **SEMESTER V**

**YEAR : III (Old Syllabus)**

**Name of the Subject : Practical V / RDBMS Lab**

**Subject Code: SAZ51**

### **Learning Objectives :**

- This course gives an exposure to visual programming using Visual Basic software.

### **Syllabus :**

Creation of a Database and performing the operations given below using a Menu Driven Program.

a) Insertion b) Deletion c) Modification d) Generating a Simple report for the following:

1. Payroll
2. Mark sheet Processing
3. Saving Bank account for banking
4. Inventory System
5. Invoice system
6. Library information system
7. Student information system
8. Income tax processing system
9. Electricity bill preparation system
10. Telephone directory maintenance

### **Learning Outcome :**

- Design and Implement simple project with Front End and Back End.

# **SEMESTER : VI**

**YEAR : III(Old Syllabus)**

**Name of the Subject :Web Technology**

**Subject Code : SAZ6A**

## **Learning Objectives :**

- ❖ This course introduces the concepts of ASP, VB Script, JavaScript.

## **Syllabus :**

**UNIT 1:** Introduction to VBScript - Adding VBScript Code to an HTML Page - VB Script Basics - VBScript Data Types - VBScript Variables - VBScript Constants - VBScript Operators – mathematical- comparison- logical - Using Conditional Statements - Looping Through Code - VBScript Procedures – type casting variables - math functions – date functions – string functions –other functions - VBScript Coding Conventions - Dictionary Object in VBScript - Err Object

**UNIT-2:** Introduction to Javascript – Advantages of Javascript – Javascript syntax - Data type –Variable - Array – Operator; Expression –Looping – control structures - Constructor Function – user defined function Dialog Box .

**UNIT 3:** Javascript document object model – Introduction – Object in HTML – Event handling – Window object – Document object –Browser object – Form object – Navigator object – Screen object – Build in object – User defined object – Cookies.

**UNIT-4:** ASP.NET Language Structure – Page Structure – Page event, Properties; Compiler Directives . HTML server controls – Anchor, Tables, Forms, Files . Basic Web server Controls – Label, Text box, Button, Image Links, Check box, radio Button, Hyperlink, Data List Web Server Controls – Check box list. Radio button list, Drop down list, Listbox, Data grid, Repeater.

**UNIT-5:** Request and Response Objects, Cookies, Working with Data – OLEDB connection class, command class, transaction class, data adaptor class, data set class. Advanced issues – email, Application issues, working with IIS and page Directives , error handling. Security – Authentication, IP Address, Secure by SSL; Client Certificates

## **Learning Outcome:**

- Designing web pages using different scripting languages will be learnt.
- Request-response pages using ASP.Net, will be learnt

## **Text Books:**

1..I.Bayross, 2000, Web Enable Commercial Application Development Using HTML, DHTML, Javascript, Perl CGI, BPB Publications.

2.A.Russell Jones, Mastering Active Server Pages 3, BPB Publications.

## **Reference Books**

1. HathleenKalata, Internet Programming with VBScript and JavaScript, Thomson Learning

2. Mike McGrath, XML Harness the Power of XML in easy steps, Dreamtech Publications

3. T.A. Powell, 2002, Complete Reference HTML , TMH.

4. J.Jaworski, 1999, Mastering Javascript, BPB Publications.

5. Powell, Thomas; Schneider, Fritz, JavaScript: The Complete Reference, 2nd edition 2004, TMH

# **SEMESTER : VI**

**YEAR : III(Old Syllabus)**

**Name of the Subject : Data Communication and Networking**

**Subject Code : SAZ6B**

## **Learning Objectives :**

- ❖ This course introduces the concepts of Networking

## **Syllabus :**

**UNIT-1:** Introduction to Data Communication, Network, Protocols & standards and standards organizations - Line Configuration - Topology – Transmission mode - Classification of Network - OSI Model - Layers of OSI Model.

**UNIT-2:** Parallel and Serial Transmission - DTE/DCE/such as EIA-449, EIA- 530, EIA-202 and x.21 interface - Interface standards - Modems – Guided Media - Unguided Media - Performance - Types of Error - Error Detection -Error Corrections.

**UNIT-3:** Multiplexing - Types of Multiplexing - Multiplexing Application -Telephone system - Project 802 - Ethernet - Token Bus - Token Ring - FDDI -IEEE 802.6 - SMDS - Circuit Switching - Packet Switching – Message switching - Connection Oriented and Connectionless services.

**UNIT-4:** History of Analog and Digital Network - Access to ISDN – ISDN Layers - Broadband ISDN - X.25 Layers - Packet Layer Protocol - ATM – ATM Topology - ATM Protocol.

**UNIT-5 :** Repeaters - Bridges - Routers - Gateway - Routing algorithms - TCP/IP Network, Transport and Application Layers of TCP/IP - World Wide Web.

### **Learning Outcome:**

- Various networking layers of OSI model and TCP/IP model will be learnt.
- Applications of Networking in real-life will be understood.

### **Text Books:**

1.Behrouz and Forouzan,2001,Introduction to Data Communication and Networking, 2nd Edition,TMH.

### **Reference Books**

1.JeanWalrand 1998, Communication Networks (A first Course),Second Edition, WCB/McGraw Hill.

2. Behrouz and Forouzan, 2006, Data Communication and Networking, 3rd Edition, TMH.

## **SEMESTER : VI**

**YEAR : III(Old Syllabus)**

**Name of the Subject : Software Testing**

**Subject Code : SAZ6C**

### **Learning Objectives :**

- ❖ This course introduces the basic concepts of software testing

### **Syllabus :**

**UNIT-1:** Introduction: Purpose – Productivity and Quality in Software – Testing Vs Debugging – Model for Testing – Bugs – Types of Bugs – Testing and Design Style.

**UNIT-2:** Flow/Graphs and Path Testing – Achievable paths – Path instrumentation – Application – Transaction Flow Testing Techniques

**UNIT-3:** Data Flow Testing Strategies - Domain Testing: Domains and Paths – Domains and Interface Testing .

**UNIT-4:** Linguistic –Metrics – Structural Metric – Path Products and Path Expressions. Syntax Testing – Formats – Test Cases.

**UNIT-5 :** Logic Based Testing – Decision Tables – Transition Testing – States, State Graph, State Testing.

### **Learning Outcome:**

- Purpose of Software testing will be learnt.
- Significance of Software testing, its types will be learnt elaborately.

### **Text Books:**

1. B. Beizer , 2003, Software Testing Techniques, II Edn., DreamTech India, New Delhi.
2. K.V.KK. Prasad , 2005, Software Testing Tools, DreamTech. India, New Delhi.

### **Reference Books**

1. Burnstein, 2003, Practical Software Testing, Springer International Edn.

- 2.. E. Kit, 1995, Software Testing in the Real World: Improving the Process, Pearson Education, Delhi.
3. R.Rajani, and P.P.Oak, 2004, Software Testing, Tata Mcgraw Hill, New Delhi.

## **SEMESTER : VI**

**YEAR : III(Old Syllabus)**

**Name of the Subject : E-commerce**

**Subject Code : SEZ6B**

### **Learning Objectives :**

- ❖ This course gives an exposure to the Electronic Commerce

### **Syllabus :**

**UNIT-1:** Electronic Commerce and Opportunities : Background The Electronic Commerce Environment – Electronic Marketplace Technologies – Modes of Electronic Commerce: Overview : Electronic Data Interchange.

**UNIT-2:** Approaches to Safe Electronic Commerce . Overview – Secure Transport Protocols – Secure Transaction – Secure Electronic Payment Protocol (SEPP) – Secure Electronic Transaction (SET)

**UNIT-3:** Certificates for Authentication – Security on Web Servers –Payment Schemes: Internet Monetary Payment and Security Requirements- Payment and purchase order process – Online electronic cash.

**UNIT-4:** Internet / Intranet Security Issues and Solutions : The Need for Computer Security – Specific Intruder Approaches – Security Strategies-Security Tools – Encryption – Enterprise Networking and Access to the Internet Antivirus Programs.- Security Teams

**UNIT-5:** MasterCard/Visa Secure Electronic Transaction : Introduction–Business Requirements – Concepts – payment Processing. E-mail and secure e-mail technologies for Electronic Commerce: Introduction \_ The Means of Distribution – A model for Message Handling- MIME, S/MIME, MOSS , MIME and Related Facilities for EDI over the Internet.

### **Learning Outcome:**

- E-commerce technologies will be learnt
- Intricate details of E-transactions, their security etc will be learnt

### **Text Books:**

1. Daniel Minoli ; Emma Minoli, “Web Commerce Technology Handbook”. Tata McGraw Hill – 1999.

### **Reference Book:**

1. K. Bajaj; D Nag , “E-Commerce”, Tata McGraw Hill – 1999.
2. Mamta Bhusry – “E-Commerce”

## **SEMESTER VI**

**YEAR : III(Old Syllabus)**

**Name of the Subject : Multimedia Systems**

**Subject Code : SEZ6D**

### **Learning Objectives :**

- ❖ This course gives an exposure to Multimedia and its applications.

### **Syllabus :**

**UNIT-1:** What is Multimedia: Definitions - CD-ROM and the Multimedia Highway - Where to use Multimedia - Introduction to Making Multimedia: The stages of a Project - What You Need – Multimedia Skills and Training: The team - Macintosh and Windows Production Platforms: Macintosh Versus PC - The Macintosh Platform – The Windows Multimedia PC Platform - Networking Macintosh and Windows Computers- Hardware Peripherals: Connection - Memory and Storage Devices - Input Devices - Output Hardware – Communication Devices.

**UNIT-2:** Basic Tools: Text Editing and Word Processing Tools – OCR Software - Painting and Drawing Tools - 3-D Modeling and Animation Tools - Image-Editing Tools - Sound Editing Tools - Animation, Video and Digital Movie Tools - Helpful Accessories - Making Instant Multimedia: Linking Multimedia Objects - Office Suites – Word

Processors - Spreadsheets - Databases - Presentation Tools. Multimedia Authoring Tools: Types of Authoring Tools - Card-and-Page-Based Authoring Tools - Icon-Based Authoring Tools - Time-Based Authoring Tools - Object-Oriented Authoring Tools - Cross-Platform Authoring Notes

**UNIT-3:** Text: The Power of Meaning - About Fonts and Faces – Using Text in Multimedia - Computers and Text - Font Editing and Design Tools - Hypermedia and Hypertext - Sound: The Power of Sound - Multimedia System Sounds - MIDI Versus Digital Audio - Digital Audio- Making MIDI Audio - Audio File Formats - Working with Sound on the Macintosh - Notation Interchange File Format (NIFF) – Adding Sound to Your Multimedia Project - Toward Professional Sound: The Red Book Standard - Production Tips

**UNIT-4:** Images: Making Still Images -Color - Image File Formats. Animation: The Power of Motion - Principles of Animation – Making Animations That Work - Video: Using Video - How Video works - Broadcast Video Standards - Integrating Computers and Television -Shooting and Editing Video - Video Tips - Recording Formats – Digital Video.

**UNIT-5:** Planning and Costing : Project Planning - Estimating - RFPs and Bid Proposals - Designing and Producing : Designing - Producing -Content and Talent : Acquiring Content - Using Content Created by Others - Using Content Created for a Project - Using Talent - Delivering: Testing - Preparing for Delivery - Delivering on CD-ROM – Compact Disc Technology - Wrapping It Up - Delivering on the World Wide Web.

### **Learning Outcome:**

- Concept of designing Multimedia applications will be learnt.

### **Text Books:**

1. Tay Vaughan - Multimedia: Making it Work. - Fourth Edition - Tata McGraw Hill Edition - 1999.
- 2 Walterworth John A - Multimedia Technologies and Application - Ellis Horwood Ltd. - London - 1991.
- 3 John F Koegel Buford - Multimedia Systems - Addison Wesley - First Indian Reprint - 2000.

# SEMESTER VI

**YEAR : III**

**Name of the Subject : Web Technology**

**Subject Code : SAZ6A**

## **Learning Objectives :**

- This course gives training in web design and applications

## **Syllabus :**

### **VB SCRIPT & JAVASCRIPT**

1. Write a program outputs the squares, roots, cubes and complements of integers between 1 and 100.
2. Create a calculator.
3. Write a script to Sort numbers and strings
4. Create a program to generate a hit counter
5. Create a program to verify whether email address provided by user is valid or invalid.
6. Write a program to scroll the text on status bar.
7. The form consists of two multiple choice list and one single choice list
  - a. the first multiple choice list display the major dishes available.
  - b. the second Multiple choice list display the stocks available.
  - c. The single choice list display the miscellaneous (Milkshakes, soft drinks, softy available etc.)
8. Write a script to create a digital clock.
9. Create a web page using two image file which switch black and white one another as the mouse pointer moves over the image. Use the On Mouse over and On Mouse event, onclick handler
10. Build a WWW page with an image and 3 buttons., Pick three favorite graphics, Label the buttons and make each one swap in the graphic you have chosen
11. Create a frameset that has two frames, side by side.

Make the left-hand frame contain a form with 3 radio buttons

The buttons should be for three search engines:

- Yahoo (<http://www.yahoo.com>)
- Altavista (<http://www.altavista.com>)
- Infoseek (<http://www.infoseek.com>)

When the user clicks on of the option buttons, the frame on the right hand side should be loaded with the right search engine.

12. Write a program to implement Employee database with all validation

### **ASP**

1. Create a login form, to expire, if the user does not type the password within 100 seconds
2. Create an employee database and manipulate the records using command object in ASP
3. Develop an application to illustrate the usage of Request and Response Objects in ASP.
4. Write an ASP program using Request Object to give the exact list of headers sent by the browser to the Web server.
5. Create an Active Server Page to display the records one by one from a student database. The student database should contain roll no, name, marks & total.
6. Design an ASP application that describes books in the Online Bookshop.(Use AD Rotator Component, Content Rotator Component, Content Linking Component)
7. Create a document and add a link to it. When the user moves the mouse over the link it should load the linked document on its own (User is not required to click on the link).
8. Create a document, which opens a new window without a toolbar, address bar, or a status bar that unloads itself after one minute.
9. Create a document that accepts the user's name in a text field form and displays the same the next time when the user visits the site informing him that he has accessed the site for the second time, and so on.

### **Learning Outcome :**

- To design interactive Web pages
- To give training in web design and applications