Gujarat University
Choice Based Credit System (CBCS)
COM 201: DATA STRUCTURE USING C++ (Theory)

Hours: 4 /week **Credits: 4**

Objected oriented Programming: C++

Unit – 1

1. Introduction
   1.1. Introduction to Object Oriented Programming.
   1.2. C++ fundamentals.

2. Classes and Objects.
   2.1. Classes
   2.2. Constructors and destructors
   2.3. Inline functions
   2.4. Friend functions and classes.
   2.5. Static class members.
   2.6. Local and nested classes.
   2.7. Passing objects to functions and returning objects from function.

3. Arrays, Pointers, References and the Dynamic Allocation Operators.
   3.1. Array of objects
   3.2. References
   3.3. Dynamic allocation operators.
   3.4. Pointers to objects
   3.5. this pointer

4. Function overloading, copy constructors and Default arguments.
   4.1. Function overloading.
   4.2. Overloading constructor functions
   4.3. Copy constructors
   4.4. Default function arguments

Unit – 2

5. Operator overloading
   5.1. Creating a member Operator Function
   5.2. Operator overloading using friend functions.
   5.3. Overloading new and delete
   5.4. Overloading some special Operators.

6. Inheritance
   6.1. Base class Access control
   6.2. Inheritance and protected members
   6.3. Inheriting multiple base classes.
   6.4. Constructor destructors and inheritance
   6.5. Virtual base class

7. Virtual functions and polymorphism

8. I/O system
   8.1. Streams and stream classes.
   8.2. formatted I/O
   8.3. File I/O
      8.3.1. Opening and closing files.
      8.3.2. Reading and writing text files.
      8.3.3. Unformatted and binary I/O

DATA Structure: -

Unit – 3:

9. Introduction to Data Structure.
   9.1 Data Management Concepts.
   9.2 Data Types-Primitive and Non-Primitive.
   9.3 Types of Data Structures-Linear and Non Linear.

10. Linear Data Structure.
   10.1. Arrays
      10.1.1. Single and multidimensional array.
      10.1.2. Storage Representation.
      10.1.3. Operations
   10.2. Stack
      10.2.1. Stack-Definition & Concepts
      10.2.2. Operations on Stacks
      10.2.3. Applications of Stacks
      10.2.4. Polish Expression and Reverse Polish Expression
      10.2.5. Recursion
      10.2.6. Tower of Hanoi

Unit – 4:

   10.3. Queue
      10.3.1. Types of Queue.
      10.3.2. Operation on Queue.
      10.3.3. Applications of Queue.
   10.4. Linked List
      10.4.1. Types of Linked List.
      10.4.2. Operations on Linked List.
      10.4.3. Applications of Linked List.

Unit – 5:

11. Non-Linear Data Structure.

- 11.1. Tree
  - 11.1.1. Definitions and Concepts
- 11.2. Graph
  - 11.2.1. Definitions and Concepts

12. Sorting & Searching

- 12.1. Sorting.
  - 12.1.1. Bubble Sort
  - 12.1.2. Selection Sort
  - 12.1.3. Insertion Sort
  - 12.1.4. Quick Sort
- 12.2. Searching.
  - 12.2.1. Linear Search.
  - 12.2.2. Binary Search.

Recommended Reference Books:-

- The complete reference C++ : Herbert Schildt, TMH.
- Object Oriented Programming in C++ - Addition Wesley.
- Object Oriented Programming in C++ - Balaguruswamy.
- An Introduction to Data Structures with Applications. by Jean-Paul Tremblay & Paul G. Sorenson Publisher-Tata McGraw Hill.
- Fundamentals of Data Structures in C++-By Sartaj Sahani.
- Aho A.V., Hopcrott and Ullman, Data Structure and Algorithms , Addition-Wesslely.

Gujarat University
Choice Based Credit System (CBCS)
COM 202: System Development Tools – 1 (Theory)

Hours: 4 /week **Credits: 4**

Visual Basic. NET

Unit : 1

1. Overview of Microsoft.NET Framework
   - 1.1 What is.NET Framework and it's benefits
   - 1.2 The Common Language Runtime (CLR), purpose of CLR
   - 1.3 Managed/Unmanaged code, Compilation & Execution
   - 1.4 Memory Management, Garbage Collection
   - 1.5 The. NET Framework class Library
   - 1.6 NET Web Services.
   - 1.7 Introduction to Ms Visual Studio. NET

2. VB.NET Programming Language.
   - 2.1 Data Types, Type Conversion Functions, Operators and Expressions.
   - 2.2 Variable Declaration: Levels, Lifetime, Scope and Accessibility.
   - 2.3 Array: Multidimensional, Jagged Array.
   - 2.4 Collections, User-Defined Data Types.
   - 2.5 Decision Structures
   - 2.6 Loop Structures: While, Do.. Loop, For.. Next, For Each…Next, with… End With.
   - 2.7 Nested Control Statements, Exit & End Statements
   - 2.8 Procedures.

Unit : 2

3. Console Applications
   - 3.1 Console Class
   - 3.2 Handling Strings, Characters and Dates

4. Designing User Interface
   - 4.1 Working with Forms
   - 4.2 Basic Windows Controls
   - 4.3 Menus, Timer, Common Dialog Controls, Rich Text Box.
   - 4.4 Tree View and List View Controls, Toolbar, Statusbar.
   - 4.5 SDI and MDI Applications.

Unit : 3

5. Object Oriented Programming
   - 5.1 Classes: Methods, Properties, Fields, Events.
   - 5.2 Overloading

5.3 Constructors and Destructors
5.4 Creating and Using Objects, Managing groups of objects
5.5 Abstraction, Encapsulation & Polymorphism

6. Files IO Streams
    6.1 Directory and Directory Info class
    6.2 Path and File Info class
    6.3 Path and Environment class
    6.4 Sequential – Access File
    6.5 Random – Access File

Unit : 4

7. Data Access
    7.1 History of Microsoft Data Access Technologies.
    7.2 Overview of ADO. NET
    7.3 The Server Explorer and Query Builder
    7.4 ADO.NET Object Model
    7.5 Programming with ADO.NET

8. Printing with VB.NET
    8.1 Print Document
    8.2 Print Dialog
    8.3 Page Setup Dialog
    8.4 Print Preview Dialog
    8.5 Print Preview Control

Reference Books:-

1. Mastering Visual Basic.NET
   By Evangelos Petroutsos – BPB
2. Professional VB.NET 2003, 2004 Edition
   By Bill Evjen, Billy Hollis, Rockford Lhotka et al. – Wrox , Wiley dreamtech
3. Visul Basic. NET Programming Bible
   By Bill Evjen, Jason Beres et al .–Wlleydreamtech
4. Visul Basic.NET How to Program, second Edition
   By H.M.Deitel, P.J. Deitel, T.R. Nieto-Person Education
   (Low Price Edition)
5. Database Access with Visul Basic.NET, Third Edition.
   By Jeffrey P. Mc Manus, Jackie Goldstein – Person Education
   (Low Price Edition)

COM 203: Practicals (Based on Data Structure using C++ and VB.NET)

Hours: 6 /week **Credits: 2.5**

List of Practicals:

C++ Practical List

1. Create a class called Temperature. User can give temperature in either Celsius or Fahrenheit. Output must be in both the form.
2. Write a program that contains a function to exchange values of two arguments (swap) by using pointers and reference parameters.
3. Write a program to take name, address as character array, age as int, salary as float and contains inline functions to set the values and display it.
4. Write a program to enter any number and find its factorial using constructor.
5. Write a program to generate a Fibonacci series using copy constructor.
6. Write a program to find the biggest of three numbers using friend function.
7. Write a program to find the sum of two numbers declared in a class and display the numbers and sum using friend class.
8. Create a class to keep track of number of its instances. Use static data member, constructors and destructors to maintain updated information about active objects.
9. Write a program to demonstrate the use of "this" pointer.
10. Write a program for finding area of different geometric shapes (circle, Rectangle, cube). Use function overloading with type, order, sequence of arguments to find the area of shapes.
11. Define a class to represent a String. Overload +, == and = operators for concatenation, comparison And copying of two Strings.
12. Write a program to calculate gross and net pay of employee from basic salary. Create employee class which consists of employee name, emp_id, and basic salary as its data members. Use parameterized constructor in the derived class to initialize data members of the base class and calculate gross and net pay of the employee in the derived class.
13. Write a program to overload unary increment(++) operator.
14. Write a program to add two matrices of mxn size using binary operator overloading.
15. Define class called list. Derive the classes stack and Queue from it. Define pure Virtual functions insert () and delete () in the class list, and override them to all its successors and implement dynamic polymorphism.
16. Write a program which shows the use of various formatting ios functions and their equivalent manipulators. Create at least two manipulators of your choice.
17. Write a program to read a text and replace "this "with "that" and write the output to another file.
18. Write a program to create binary file to store Employee details. Insert 10 records to that file and display the specific record as per the employee code.

Data Structure Practical List

1. Write a program to insert and delete elements in a single Dimension Array.
2. Write a program to merge two array lists.
3. Write a program for Transpose of matrices
4. Write a program to solve the Tower of Hanoi problem. (Using recursion)
5. Write a program to print n Fibonacci series (using recursion).
6. Convert decimal number into binary. (Using recursion).
7. Find X^N, i.e. power (x,n) (using recursion).
8. Write a program to convert infix expression into postfix expression using stack.
9. Implement a program for stack that performs following operations using array. (a) PUSH (b) POP (c) PEEP (d) CHANGE (e) DISPLAY
10. Write a program to implement QUEUE using arrays that performs following operations (a) INSERT (b) DELETE (c) DISPLAY
11. Write a program to implement Circular Queue using arrays that performs following operations. (a) INSERT (b) DELETE (c) DISPLAY
12. Write a menu driven program to implement following operations on the singly linked list.
    (a) Insert a node at the front of the linked list.
    (b) Insert a node at the end of the linked list.
    (c) Insert a node such that linked list is in ascending order.(according to info. Field)
    (d) Delete a first node of the linked list.
    (e) Delete a node before specified position.
    (f) Delete a node after specified position.
13. Write a program to implement stack using linked list.
14. Write a program to implement queue using linked list.
15. Write a program to implement following operations on the doubly linked list.
    (a) Insert a node at the front of the linked list.
    (b) Insert a node at the end of the linked list.
    (c) Delete a last node of the linked list.
    (d) Delete a node before specified position.
16. Write a program to implement following operations on the circular linked list.
    (a) Insert a node at the end of the linked list.
    (b) Insert a node before specified position.
    (c) Delete a first node of the linked list.
    (d) Delete a node after specified position.
17. Write a program to implement Binary Search.
18. Write a program to implement Linear Search.
19. Write a program to implement Quick Sort.
20. Write a program to implement Insertion Sort.

VB.NET Practical List

1. Write a program to calculate the sum of 100 natural numbers.
2. Write a program to calculate the sum of 100 odd numbers.
3. Write a program to generate the factorial operation.
4. Write a program to display ‘hello’ in the text box when you click display hello button.
5. Write program to create status bar.
6. Write a program to accept any character from keyboard and display whether it is vowel or not.
7. Write a program to perform Money Conversion.
8. Develop an application for facilitating purchasing order.
9. Develop a form in VB .NET to pick a date from calendar control and display the day, month, year in separate textboxes.
10. Write a program for demonstrating use of jagged array.
11. Write a program for demonstrating inheritance.
12. Write a program for demonstrating interface.
13. Write a program using delegation in which addition and subtraction of two integer value possible.
14. Develop a VB .NET application using the File and Directory controls to implement a common dialog box.
15. Develop an application using tree view control.
16. Develop an application using font dialog control.
17. Develop an application using color dialog control.
18. Develop a database application to store the details of students using ADO.NET
19. Develop a Database application using ADO.NET to insert, modify, update and delete operations.
20. Develop a VB.NET application using DataGrid to display records.