

B.Sc. with Computer Science Syllabus

I Semester, DSC 1A

Object Oriented Programming with C++

Unit I

Algorithm and its characteristics, pseudo code / flow chart, program.

Object Oriented Programming: Introduction, Generation of programming Languages, Programming Paradigms, Features of Object Oriented Programming, Merits and Demerits of Object Oriented Programming Language.

Basics of C++ Programming: Introduction, History, Structure, Writing the First C++ Program, Files used in a C++ Program, Compiling and Executing, Using Comments, Tokens, Characters Set, Keywords, Identifier, Data Types, Variables, Constants, Input and Output, Statements, Operators, Type Conversion and Type Casting,

Decision Control and Looping Statements: Introduction to Decision Control Statements, Conditional Branching Statements, Iterative Statements, Nested Loops, Break Statement, Continue Statement, Goto Statement, Avoiding Usage of Break, Continue, and Goto Statements

Unit II

Functions: Introduction, Need for Functions, Using Functions, Function Declaration or function, Prototype, Function Definition, Function Call, Return Statement, Passing Parameters to the Function, Default Arguments, Return by Reference, Passing Constants as Arguments, Variables Scope, Storage Classes, Inline Functions, Function Overloading, Recursive Functions, Recursion Versus Iteration, Function with Variable Number of Arguments

Arrays: Introduction, Declaration of Arrays, Accessing Elements of the Array, Storing Values in Arrays, Calculating the Length of Array, Operations that can be Performed on Arrays, One Dimensional Arrays for Inter Function Communication, Two Dimensional Arrays, Multi Dimensional Arrays,

Pointers: Defining Pointers, Declaring Pointer Variables, Pointer Expressions and Pointer Arithmetic, Null Pointers, Generic Pointers, Passing Arguments to Function Using Pointer, Pointer and Arrays, Passing Array to Function, Differences Between Array Name and Pointer, Pointer to function, Arrays of Function Pointers, Memory Allocation in C++, Dynamic Memory Allocation,

Unit III

Structure, Union, and Enumerated Data Types: Structure Declaration, Typedef Declaration, Initialization the Structures, Accessing the Members of a Structures, Union, Union Inside Structures, Enumerated Data Types.

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Classes and Objects : Specifying a Class, Creating Objects, Accessing Object Members, Nested Member Functions, Making a Member Function Inline, Memory Allocation for Class and Objects, Returning Objects, this Pointer, Constant Parameters and Members, Pointers within a Class, Local Classes, Nested Classes in C++, Empty Classes, Friend Function, Friend Class, Bit-Field in Classes, Pointers and Class Members.

Constructors and Destructors: Constructor, Types of Constructors, Constructor with Default Arguments, Constructor Overloading, Destructors.

Unit IV

Operator overloading and Type Conversions : Scope of Operator Overloading, Syntax for Operator Overloading, Operators that can and cannot be Overloaded, Implementing Operator Overloading, Overloading Unary Operators, Overloading Binary Operators, Overloading Special Operators, Type Conversions.

Inheritance and Run-Time Polymorphism : Defining Derived Classes, Access Specifiers, Type of Inheritance, Single Inheritance, Constructors and Destructors in Derived Classes, Multi level Inheritance, Constructor in Multi Level Inheritance, Multiple Inheritance, Constructor and Destructor in Multiple Inheritance, Ambiguity in Multiple Inheritance, Hierarchical Inheritance, Constructors and Destructors in Hierarchical Inheritance, Hybrid Inheritance, Multi-path Inheritance, Virtual Base Classes, Object Slicing, Pointer to Derived Class, Run time Polymorphism, Virtual Functions, Pure Virtual Functions, Abstract Base Classes, Concept of Vtables, Virtual Constructor and Destructor.

Templates: Introduction, Use of templates, Function templates, Class templates.

Text Book:

1. Reema Thareja “Object Oriented Programming with C++” Oxford university Press, 2015

Recommended Books

1. E. Balagurusamy “Object Oriented Programming with C++” TMH, 6th edition, 2013.
2. Richard Johnson, *An Introduction to Object-Oriented Application Development*, Thomson Learning, 2006
3. B. Stroustrup, *The C++ Programming Language*, Addison Wesley, 2004.
4. Spoken Tutorial on “C++” as E-resource for Learning:- <http://spoken-tutorial.org>

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Practical: Object Oriented Programming with C++

NOTE:

- All the concepts of programs from Text Book including exercises must be practice, execute and write down in the practical record book.
- Faculty must take care about UG standard programs it should be minimum 25 – 30.
- In the external lab examination student has to execute at least three programs with compilation and deployment steps are necessary.
- External Viva-voce is compulsory.

Example programs:

- 1) Write a program to test Arithmetic operators.
- 2) Write a program to Swap two numbers.
- 3) Write a program to demonstrate Switch statement.
- 4) Write a program to find roots of a quadratic equation.
- 5) Write a program to check whether the given number is palindrome or not.
- 6) Write a program to convert binary number to decimal number.
- 7) Write a program to print the following format.

| | | | |
|---|---|---|----|
| 1 | | | |
| 2 | 3 | | |
| 4 | 5 | 6 | |
| 7 | 8 | 9 | 10 |
- 8) Write a program to search an element in a given list.
- 9) Write a program to perform addition of two Matrices.
- 10) Write a program to perform multiplication of two Matrices.
- 11) Write a program to find factorial of a given number using recursion.
- 12) Write a program to demonstrate Pointer arithmetic
- 13) Write a program to demonstrate Call-By-Value, Call-By-Address, Call-By-Reference.

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- 14) Write a program to demonstrate Structure data type.
- 15) Write a program to demonstrate Enumerated data type.
- 16) Write a program to demonstrate inline functions.
- 17) Write a program to demonstrate Function Overloading.
- 18) Write a c++ program to demonstrate Class concept.
- 19) Write a c++ program on Constructor overloading.
- 20) Write a c++ program on Destructor.
- 21) Write a c++ program for copy constructor.
- 22) Write a c++ program to demonstrate Friend function.
- 23) Write a c++ program for Unary operator overloading (Friend function/Member function).
- 24) Write a c++ program for Binary operator overloading (Friend function/Member function).
- 25) Write a c++ program for Member Function overloading within a class
- 26) Write a c++ program for Single and Multilevel Inheritance.
- 27) Write a c++ program for Overriding of member functions.
- 28) Write a c++ program to demonstrate constructor calling mechanism in inheritance.
- 29) Write a c++ program for Multiple and Hybrid inheritance.
- 30) Write a c++ program to demonstrate pure virtual function implementation.