

ALLAMA IQBAL OPEN UNIVERSITY, ISLAMABAD
(Department of Computer Science)

WARNING

1. **PLAGIARISM OR HIRING OF GHOST WRITER(S) FOR SOLVING THE ASSIGNMENT(S) WILL DEBAR THE STUDENT FROM AWARD OF DEGREE/CERTIFICATE, IF FOUND AT ANY STAGE.**
2. **SUBMITTING ASSIGNMENTS BORROWED OR STOLEN FROM OTHER(S) AS ONE'S OWN WILL BE PENALIZED AS DEFINED IN "AIOU PLAGIARISM POLICY".**

Course: Programming Language-I (3407)
Level: BS (CS)

Semester: Autumn, 2012
Total Marks: 100
Pass Marks: 50

ASSIGNMENT No. 1
(Units: 1–4)

Note: All questions are compulsory. Each question carries equal marks.

- Q. 1 (a) Compare the languages, C and C++. What are the important features of C++ that are not of C language?
- (b) What is the object-oriented approach? What are the main characteristics of object-oriented languages?
- Q. 2 (a) Use for loops to construct a program that displays a diamond shape of asterisks (+) on the screen. The diamond should look like shown here, except that it should be 9 lines high, instead of 5 lines. One way to do this is to nest two inner loops, one to print spaces and one to print asterisks (+), inside an outer loop that steps down the screen from line to line.
- ```
+
+++
++++
+++
+
```
- (b) Write a program that allows the user to enter a floating-point number representing degrees Celsius, and then displays the corresponding degrees Fahrenheit. The formula for Fahrenheit is  $F = (9/5)*C + 32$ .
- Q. 3 (a) What is the principle reason for passing arguments to a function by reference? In what unusual place can you use a function call when a function returns a value by reference?

- (b) Write a function that takes three distance values as arguments and returns the smallest one. Include a main ( ) program that accepts three distance values from the user, compares them, and displays the smaller.
- Q. 4 (a) If three objects of a class are defined, how many copies of that class's data items are stored in memory? How many copies of its member functions?
- (b) For what purpose constructors and destructors are used? When they are created and called? What is an overloaded constructor? Explain with the help of a suitable example.
- Q. 5 (a) Write a program that allows the user to input a number of integers, and then stores them in an int array. Write a function called maxint ( ) that goes through the array, element by element, looking for the largest one. The function should take as arguments the address of the array and the number of elements in it, and return the index number of the largest element. The program should call this function and then display the largest element and its index number.
- (b) Write a program that reads a group of numbers from the user and places them in an array of type float. Once the numbers are stored in the array, the program should calculate the average of the input numbers, find the smallest and the largest number from the group of input numbers and print the result for all calculations. Use pointer notation wherever possible.

## ASSIGNMENT No. 2

(Units: 5–8)

**Total Marks: 100**

**Pass Marks: 50**

**Note:** *All questions are compulsory. Each question carries equal marks.*

- Q. 1 (a) Assume a class Derv derived from a base class Base. Both classes contain a member function func( ) that takes no arguments.
- (i) Write a statement to go in a member function of Derv that calls func( ) in the base class.
- (ii) Write the declarator for a derived-class constructor that takes one argument and passes this argument along to the constructor in the base class.
- (b) Compare the three access specifiers; Public, Private, and Protected. What are the major advantages and disadvantages of these access specifiers?
- Q. 2 (a) Assuming that class X does not use any overloaded operators, write a statement that subtracts an object of class X, x1, from another such object, x2, and places the result in x3.
- (b) When used in prefix form, what does the overloaded ++ operator do differently from what it does in postfix form?

- (c) If obj A is in class A, and obj B is in class B, and you want to say obj A = obj B; and you want the conversion routine to go in class A, what type of conversion routine might you use?
- Q. 3 In a loop, prompt the user to enter name data consisting of a first name, middle initial, last name, and employee number (type unsigned long). Then, using formatted I/O with the insertion (<<) operator, write these four data items to an of stream object. Don't forget that strings must be terminated with a space or other whitespace character. When the user indicates that no more name data will be entered, close the of stream object, open an if stream object, read and display all the data in the file, and terminate the program.
- Q. 4 (a) What is meant by throwing an exception? What is the sequence of events when an exception occurs?  
(b) Write a template function that returns the average of all the elements of an array. The arguments to the function should be the array name and the size of the array (type int). In main ( ), exercise the function with arrays of type int, long, double, and char.
- Q. 5 (a) Explain the difference in operation between these two statements;  
Person p1 (p0);  
Person p1 = p0;  
(b) If within a class, tm is a member variable, will the statement this.tm 53; assign 53 to tm?  
(c) Write a statement that a member function can use to return the entire object of which it is a member, without creating any temporary objects.  
(d) Write the declaration for a friend function called square ( ) that returns type void and takes one argument of class shape.
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## **3407 Programming Language-I**

**Credit Hours: 4 (3+1)**

### **Recommended Book:**

**The Wait Group's Object Oriented programming in C ++ 3<sup>rd</sup> Edition by Robert Lafore**

### **Course Outline:**

#### **Unit No. 1 Introduction**

History of C++, Comparison of C and C++, C++ Compilers, Program Structure, Basic Input and Output Statements, Programming Exercise

#### **Unit No. 2 Object Oriented Programming Concepts**

Object Oriented Approach, Objects and Classes, Characteristics of OO Languages (Inheritance, Polymorphism, Reusability, Overloading), Advantages of OOP, Programming Exercise

**Unit No. 3 Classes and Objects**

Class definition, Class Objects, Constructors, Default Copy Constructor, Objects as Function Arguments, Functions returning Objects, Programming Exercise

**Unit No. 4 Arrays, Pointers and Functions**

Static Memory Allocation using Arrays, Dynamic Memory Allocation and De-Allocation using Pointers, Functions returning Pointers, Function call using Pointers, Passing Pointer as a function parameter, Function overloading, Inline Functions, Programming Exercise

**Unit No. 5 Inheritance**

Derived and Base Classes, Derived Class Constructors, Overriding Member Functions, Class Hierarchies, Public, Protected & Private Inheritance, Levels of Inheritance, Multiple Inheritance, Programming Exercise

**Unit No. 6 Files and Streams**

Streams, String I/O, Character I/O, Object I/O, I/O With Multiple Objects, File Pointers, Disk I/O With Member Functions, Error Handling, Redirection of Input and Output, Command Line Arguments, Printer Output, Programming Exercise

**Unit No.7 Operator Overloading &virtual Functions**

Operator Overloading (Unary Operators, Binary Operators, Data Conversion), Virtual Functions, Late binding, Abstract Classes and Pure Virtual Functions, Virtual Destructors, Virtual Base Classes, Friend Function, Static Functions, Programming Exercise

**Unit No. 8 Templates and Exceptions Handling**

Function Templates, Class templates, Exceptions syntax, Simple and Multiple Exceptions, Exceptions with arguments, Programming Exercise

**Unit No. 9 Visual C++ Overview**

Introducing Windows Programming, Console Applications, Integrated Development Environment (The Editor, Compiler, The Linder, The Libraries, App Wizard, Class Wizard, Wizard Bar), Documentation, Projects and Workspaces, Defining a Project, Debug and Release versions, Introduction to MRF, Structure of an MFC program, Creating and Executing a Windows Program, Programming Exercise

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