INDIAN INSTITUTE OF TECHNOLOGY
DEPARTMENT OF MATHEMATICS
END-AUTUMN SEMESTER EXAMINATION- 2015

TIME : 3 HOURS FULL MARKS : 50

Subject : Object Oriented System Design/Object Oriented Programming

(MA61001+MA31011+ MA60047)

Total No. of Students: 83

ANSWER ANY FIVE QUESTIONS

Q1. Fill-in the blanks in each of the following:

(i) Header file_____ contains the declarations required for user-controlled file processing.

(ii) The stream manipulators that format justification are _____, _____ and _____.

(iii) Casting a base-class pointer to a derived-class pointer is called _____.

(iv) Overridable functions are declared using keyword_____ .

(v) The _____, _____ and _____ of an operator cannot be changed by overloading the operator.

(vi) Class members are accessed via the _____operator in conjunction with the name of the object (or reference to an object) of the class or via the _____operator in conjunction with a pointer to an object of the class.

(vii) The elements of an array are related by the fact that they have the same _____ and _____.

(viii) A member function should be declared static if it does not access _____ class members.

(ix) The operator _____ dynamically allocates memory for an object of a specified type and returns a _____to that type.

(x) C++ provides for_____, which allows a derived class to inherit from many base classes, even if these base classes are unrelated.

(1×10 =10)

Q2.(a) What do you mean by inheritance and multiple inheritance in OOP? Give one suitable example for both of them. How multiple inheritance is resolved? Organize the following classes into inheritance hierarchies and where appropriate create new classes.

Student, Lecturer, Technician, Administrator, Office, Lab, Post graduate Student, Undergraduate student, Lecture, and Building

(4)

(b) Distinguish between "this" pointer and "self referential" pointer? Write a C++ program for concatenating two strings using pointers and pointer arithmetic.

(4)

(c) Write an efficient C++ program using pointers to explain the assignment and copy constructors over the strings used as objects.

(2)

Q3. (a) What is a destructor? When is it called? Write a C++ program to keep track of number of instances of objects of a class created, alive and destroyed using member functions, constructors and destructors.

(4)

(b) What is polymorphism? How can we achieve compile time and run time polymorphism?

(3)

(c) What are streams? Discuss the various stream errors bits set in stream I/O to validate an I/O operation.

(3)

Q4. (a) What is meant by exceptions? Give at least five types of exceptions frequently found in OOP. Explain how any one of them can be handled in C++.

(3)

(b) An integer number is said to be a perfect number if its factors including 1 but not the number itself, sum to the number. For Example, 6 is a perfect number as 6 = 1+2+3. Write a Java program that prompts the user for a number and displays it if it is a perfect number.

(3)

(c) Write a function called revisit ( ) in C++ that reverses a string. Use a for loop that swaps the first and last characters, then the second and next to last characters and so on. The string must be passed to revisit ( ) as an argument.

(4)

Q5. (a) The operators "new" and "delete" are used for dynamically allocating and releasing memory. Suppose, we want to overload them so that they can allocate from and release memory to a pool of available memory. Write functions for overloading new and delete operators in this manner.

(5)

(b) Write a C++ program that uses a function template Selection-Sort to sort an array of integers and an array of floating point numbers using menu driven formatted input data and output data to display the sorted array.

(5)

Q6. (a) Distinguish between sequential and random access files. Write a menu driven C++ program for maintaining the amount receivable from the clients of a company. For each client, the account number, name and balance is to be maintained. Taking account number as the key field, create a sequential file and display the account information of those clients which have zero, negative and positive balances.

(5)

(b) Write the syntax for creating user defined manipulators. Explain manipulators boolalpha and setfill in stream I/O. Design a single manipulator to provide the following output specifications for printing float values:
(i) 8 column width, (ii) 5 digit precision and (iii) filling of unused spaces with $.

(5)

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