Bengal Engineering and Science University, Shibpur
B.E. 4th Semester Examination, 2010
Object Oriented Technology (CS 403)

F.M:70 Time: 3 hrs.

Attempt question number 1 and any FOUR from the rest.

1. a) What are the different steps in Object Oriented Analysis (OOA) phase of Object - Oriented System Development? Discuss briefly each of them. (6)

   b) Specify the functional requirements for the following computerized ATM banking system and construct a Use Case Diagram (UCD) corresponding to the actor "Bank Client".

   Problem Statement: You need to design software for supporting a computerized ATM banking network. All the accounts maintained and transactions (including ATM transaction) effected are to be processed by the computers in the bank. An ATM accepts a relevant cash card, interacts with the user, communicates with the central system to carry out the transaction, dispenses cash, and prints receipts. The system to be designed and implemented must include appropriate record keeping and security provisions. The system must handle concurrent accesses to the same account. (3 + 5)

2. a) Perform Textual **analysis** to identify a list of classes and draw the class diagram for the above mentioned problem. (3+5)

   b) Discuss different relationships that may arise between two classes (6)

3. a) Mention some special characteristics of static data members and static member functions. (3)

   b) Constructor with default arguments may causes ambiguity - discuss it. (3)

   c) What are the two different techniques for overloading operators in C++? Define a class VECTOR with necessary data members and member functions to represent a vector. Define one-argument constructor to create and initialize the vector. Can you overload the multiplication operator * by both the operator overloading techniques to compute C = ***a*** * B, where. B, C are objects of type VECTOR and ***'a'*** is an integer constant? If 'yes* then write the overloading function else explain why it is not possible. **(8)**

4. a) Mention some rules that a virtual function must satisfy. Describe the usefulness of a virtual function by writing a suitable C + + program. What is a pure virtual function? (2+4+2)

   b) Design a template class that is used to create a linked list of integers or floats. Implement "insert" and 'delete" operations. Also check if the linked list is empty or not. (6)

5. a) What are private, public and protected inheritance? Why do we need different access specifier? (4)

b) How can we resolve ambiguities that may occur in case of single and multiple inheritances? (4)

c) Define a base class named **stack** with two member functions **push_data( ) and pop_data(**). The function **push_data(**) is used to insert data into the stack and **pop_data()** is used to remove data from the stack. Suppose, there is no overflow and underflow checking inside these two functions. Now define an appropriate derive class to incorporate overflow and underflow checking. Also define other member functions (if required) of base class **stack** and write the main ( ) function. (6)

6. a) Specify the function of any three manipulators supported by C + + used for formatting the output. Discuss the syntax for creating user-defined manipulators. Design a single manipulator to provide the following output specifications for printing float values:
(i) 10 columns width (ii) Right-justified (iii) Two digits precision (iv) Filling of unused places with * (v) Trailing zeros shown (3+1+4)

b) Write a program containing a possible exception. Use a **try** block to throw it and **catch** blocks to handle it properly. Demonstrate the concept of rethrowing an exception. (4+2)

7. a) What are the order of executions **of** constructors during the creation of derived class objects with multiple inheritance. Assume that a base class may also be a virtual class.

b) What are the functions supported by file stream classes for manipulation of file pointers? How they are used to move the pointers forward and backward along the file? (4)

c) What are the advantages of saving data in binary form? Describe how would you determine number of objects in a file. When do we need such information? (2+3+2)