B. CSE 2ND Year 2ND Semester Examination, 2017

Object Oriented Programming

Full marks: 100

Time: 3 hours

Attempt any five questions

1) a) What is the major difference between procedural and object oriented programming? What is data abstraction? 4
   b) Compare structure in C and class in object oriented programming. 2
   c) Compare macro and inline function. 2
   d) Design the necessary classes for the following system (mention the classes, their attributes, methods along with signature, a textual description for the methods. No code is required.):
   Each faculty has faculty id (it is unique), name and phone number. Each subject has subject code (it is unique), subject name and type (denotes whether it is core subject or elective). A list of faculty is maintained where faculty information is to be stored and a subject list will be there. Given a faculty id, one can get the faculty details. Given a subject code one can find the subject details. A faculty may be specialized in multiple subjects and number of faculty may be specialized in one subject. Specialization information is also be maintained. For a subject one should be able to find out details of the faculties who are specialized in that. Similarly given a faculty, one should be able to find out the details of the subjects in which he/she is specialized. One should be able to find out the list of all core/elective subjects, list of all faculties. 12

2) a) **Internal_marks** is a class with two class test scores as private data members. **Semester_marks** is a class with semester score out of 100 as private data members. Design the classes and a global function to compute final score as average class test score + 0.7*semester score. Complete code (in C++) for the global function and necessary methods in the classes is required. 6
   b) Design and implement a generic class in C++ that can store and work with an array of numeric elements. Size may be defined at the time of object creation. Two objects can be added (it adds corresponding elements) provided they are of same size. If X is an object then cout << X will print all the elements. An object can also be initialized with another object and the object will have its own copy. 8
   c) What is the utility of static members in a class? 3
   d) What is the utility of inheritance? 3

3) a) An electric supply corporation maintains following information for every connection: consumer-id, consumer-name, consumer-address, meter-id, last reading and current reading. For every connection, meter rent is charged and that is same for all. But it may change time to time. For every connection a bill is periodically generated. Billed amount comprises of meter rent and consumption charge (i.e. per unit charge * difference between last and current reading. Per unit charge is different for commercial and domestic connection (these are only two possible types of connection). A fixed amount as caution deposit is also collected when connection is initially provided to a consumer and it is different for different types of connection. Design the necessary classes 10

b) Why may we need a virtual base class in C++? How does the system implement this? 5

c) What will you do to achieve runtime polymorphism in C++ and In JAVA? 5

4) In an institute for each student name, address and unique class roll number are stored. During examination unique exam roll number is also assigned to each student. The mapping between the two roll numbers of a student is to be maintained Final score sheet contains the examination roll number, and score of all the students Student information, mapping and score-sheet are to be stored in files. Design the classes and write the code (in C++) to support the following: i) Store the score-sheet in the file. In doing so, it must check that exam roll number is valid; score of this candidate does not already exist. ii) Find the details of the students with highest score. 20

5) a) An organization maintains the list (do not consider file) of the items they deal with. For each item, item code (unique), name, price and quantity in stock are stored. One should be able to add new item, to delete the entry corresponding an item code, to find the details for an item code, to update quantity in stock for an item code, to show total value of the stock (sum of [price * quantity in stock] of all items). Design and implement the classes in JAVA. 10

b) In JAVA, how does package influence the accessibility of a class and its members? What will you do to create a package pack1.pack11? 6

c) What is utility of abstract class? How will you make a class abstract in C++? 4

6) a) What are the two ways of creating threads in JAVA? Which one you will prefer and why? How will you specify the code for a thread? 6

b) MyData is an existing class with two methods getdata() and setdata() which works with the data members. The methods are not synchronized. The class cannot be modified. Two types of threads are to be created. One will use getdata() and another will use setdata(). Access to MyData object is to be serialized. Explain with a piece of code in JAVA, how will you do this? 8

c) There is a binary file **number.dat** that stores integers. Write the code in JAVA to read all the integers from the file.   6

7) a) What is an applet? Compare a GUI application and Applet.   5
   b) Design a GUI based application or applet that will allow user to select only one out of four options and once OK button is placed, the selected option will be shown in a message box.   8
   c) Describe the following GUI components: JComboBox, JList   7

8) Write short notes on the following:
   a) Virtual destructor in C++
   b) Friend function in C++
   c) Life cycle of an Applet
   d) Wrapper classes in JAVA
   e) Exception handling in JAVA   4+3+4+4+5

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