3rd Semester B Tech Examination, Nov 2004

OBJECT ORIENTED PROGRAMMING USING C++

Full Marks : 70
Time : 3 hours

Answer question 1 and any five from questions 2 to 8

The figures in the right hand margin indicates mark

Parts of the same question should be answered together in the same sequence

1, Identify whether the following statements are true or false. Justify your answer in each case

2 X 10

a. A virtual base class is useful in C++ when the different methods in the base and derived classes have the same name.
b. It is prudent to use the default destructors provided by the C++ language rather than writing specified destructors for a class.
c. In C++ suppose you derive a class named manager from a class named employee. Then you can assign an object of the manager class without encountering any compilation error.
d. C++ classes can be considered as abstract data type (ADTs)
e. Deep class hierarchies are signs of an object oriented design done well.
f. The aggregation relationship among classes is symmetric.
g. The use of the inheritance features in an object oriented program result in code reuse.
h. The aggregation relationship among classes can be considered to be a special type of association relationship.
i. An object oriented program that does not derive new classes through inheritance can not exhibit polymorphic behaviour through dynamic binding.

2, Write C++ for the following description of the class / subclass :

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Define an abstract base class " Geomshape" that has the following
- Data members for the (x,y) coordinate position
- A constructer for initializing Geomshapes
- A virtual method 'MoveShape()'
- A virtual method 'PrintShape()' to output an object

Derive subclasses 'GeomLine','GeomCircle', and 'GeomTriangle' from 'GeomShape' and 'MoveShape()' and 'PrintShape()' methods for each of the sub-classes. You may assume appropriate data members for each of the subclasses. You should use appropriate access controls in 'GeomShape'.

5 X 2

3. a. An abstract class cannot have instances. What then is the use of having abstract classes. Explain your answer using a suitable example.

b. What is the difference between method overloading & method overriding. Explane your answer using a suitable example.

5 X 2

4. a. Explain why object oriented programs are more maintainable and reusable compared to function oriented program.

b. Give the definition of a virtual base class C++ syntax. Explain why virtual base classes are required.

5 X 2

5. a. What do you understand by exceptions in a C++ program. With an example explain how exceptions are handled in a C++ program.

b. What do you mean by public, protected and private attributes of a class. Why is this distinction among attributes necessary. Explain your answer using suitable examples.

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6. Consider a small student's library. The library has a book catalog consisting of 100 issuable items. Each issuable item can either be a book or a periodical. The issue methods of the books and periodicals override the issue method of the issuable class. The member catalogue consists of 50 members. Each member is either a teacher or student. When a book is issued, the member's identity is recorded in the book of objects. Also, the member object must record the book issued to him. Once a book is returned, these associations are dissolved. Represent your design using Booch's notations. Write C++ code to implement your design for the library system.

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7. a. Explain the problem of the repeated inheritance. With the help of an example explain how this problem can be overcome in C++.
b. Explain the following concepts and explain how they can be implemented in C++ language by using suitable examples.
- Inheritance
- Composition
- Abstract Class

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8. a. Write C++ code for the following description of the class "circle". A C++ class named "circle" stores the co-ordinate position of the centre of a circle and its radius as three floating point numbers. It supports the following methods :

- Circle:constructor method which initializes the centre & radius of the circle during object creation.
- Print: displays the current centre and radius of the circle.
- Change: changes the center point and radius to the specified values.

b. Define the following overloaded operators.
- = = checks whether two circles are identical.
- = circle alignment.