Reg. No. : ....

Name : ....

Fourth Semester B.Tech. Degree Examination, February 2016
(2013 Scheme)
13.403 : OBJECT ORIENTED TECHNIQUES (FR)

Time : 3 Hours   Max. Marks : 100

PART – A

All questions are **compulsory**. **Each** question carries **4** marks.

1. In the given code, what are the different ways used in passing arguments to the function ? Also give the values of a, b and c before and after function call.

   ```
   void fun(int a1, int &a2, int*a3)
   {   a1 = a1 +1;
       a2 = a2 +2;
       *a3 =*a3+1;
   }
   main()
   {
   int a=5,b=10, c=20;
   fun(a,b&c);
       }
   ```

2. Can a function return a reference ? Demonstrate with an example.

3. With examples illustrate the difference between function overloading and function overriding.

4. Base class has some virtual method and derived class has a method with the same name. If the base class pointer is initialized with derived object, calling of that virtual method will result in which method being called ? Justify your answer.

5. Write a program to demonstrate the concept of rethrowing an exception.

(5×4= 20 Marks)

PART – B

Answer **one** questions from **each** Module. **Each** question carries **20** marks.

Module – I

6. a) Write a function to form the square out of whatever character is contained in character parameter fillChar. Thus, if side is 3 and fillChar is #, then this function should print the following. Use a default value of 5 side and $ for fillChar. Write a main program to test the function.   **12**

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   b) How is dynamic memory management done in C++ ? Is anything wrong with the following code ? If so, state the error.   **8**

   T*p = new T[10];

   delete p;

7. a) Write functions "average(...)" and "standard-deviation(...)". The functions should return the average and standard deviation respectively of 1, 2, 3 or 4 real number values. The standard deviation of the numbers r1, ..., rN is defined as the square root of the average of the expressions

   $((r1 - a) \times (r1 - a)), ((r2 - a) \times (r2 - a)), ..., ((rN - a) \times (rN - a))$

   where a is the average value of r1, ..., rN. Use C++'s facility for polymorphic functions, and overload the function names.   **15**

   b) List few areas of application of OOP technology.   **5**

Module – II

8. a) Create class IntegerSet for which each object can hold integers in the range 1 through 100. The default constructor initializes a set to the so-called "emptyset", i.e., a set for which all elements contain zero. Provide an additional constructor that receives an array of integers and the size of that array and uses the array to initialize a set object.

   i) Provide a unionOfSets member function that returns a third set that is the set-theoretic union of two existing sets.

    ii) Provide an intersectionOfSets member function which returns a third set that is the set-theoretic intersection of two existing sets passed as parameters.

    iii) Instantiate necessary IntegerSet objects to test that all the member functions work properly.   **12**

b) Explain the significance of using static data members and member functions.   **8**

9. a) Differentiate between default constructor and other constructors.   **6**

  b) Create two classes. The first, named Sale, holds data for a sales transaction. Its private data members include the day of the month, amount of the sale, and the salesperson's ID number. The second class, named Salesperson, holds data for a salesperson, and its private data members include each salesperson's ID number and last name. Each class includes a constructor to which you can pass the field values. Create a friend function named display() that is a friend of both classes and displays the date of sale, the amount, and the salesperson ID and name. Write a main() demonstration program to test your classes and friend function.   **14**

Module – III

10. a) Develop a C++ program to convert the Cartesian coordinates into Polar coordinates using cast operator function and polar to Cartesian coordinates using converting constructor function.

    Cartesian Co-ordinates : $x = r\cos\phi$

                                     $y = r\sin\phi;$

    Polar Co-ordinates : $r = \text{sqrt}(x^2\_y^2)$

                                     $\phi = \tan^{-1}(y/x)$ **14**

  b) How are prefix and postfix versions of operator ++() differentiated in C++ ?   **6**

11. a) Discuss the different types of inheritance supported by C++ language. 6

    b) Consider an application for displaying the examination result. Design three classes: Student, Exam and Result. The Student class has data members such as those representing roll number, name, etc. Create the class Exam by inheriting the student class. The Exam class adds data members representing the marks scored in six subjects. Derive the result from the exam class and it has its own data members such as total marks. Write an interactive program to model this relationship. 14

Module – IV

12. a) Create a class Pensioner that includes private data members such as name, age, gender, PAN number, pension_amount. Create an array of Pensioner objects and write these objects to the file. Include a member function is Eligible() to determine the eligibility of the pensioners to avail discounts in fares in public transport systems. Also include functions to display the list of eligible pensioners details in a table format and write the list into a new file. The criteria for eligibility are as follows :

     i) The pensioner should be in the income category below Rs. 3,500

     ii) If the pensioner is male. 14

    b) Sketch the hierarchy of stream classes supported by the C++ language. 6

13. a) What are the methods that support random file access ? 6

    b) Create a template class point with two data members to represent x and y co-ordinates. Include public methods to display, set and swap the values. Write a main function that creates a Point object and calls the public methods. 14

(4× 20= 80 Marks)