

ALCCS – OLD SCHEME

Time: 3 Hours

FEBRUARY 2013

Max. Marks: 100

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE:

- **Question 1 is compulsory and carries 28 marks. Answer any FOUR questions from the rest. Marks are indicated against each question.**
- **Parts of a question should be answered at the same place.**

- Q.1**
- a. Discuss the main features of object oriented programming.
 - b. Name the implicit member functions of a class. Mention the four cases.
 - c. Draw an inheritance hierarchy for students at a university. Use student as the base class of the hierarchy, then include classes UndergraduateStudent and GraduateStudent that derive from Student. Freshman, Sophomore, Junior, senior derive from UndergraduateStudent, and DoctoralStudent and MastersStudent derive from GraduateStudent.
 - d. When do you call copy constructors? Mention the three cases.
 - e. What is the type of 'this' pointer? When does it get created? Explain the significance of 'this' pointer with respect to static member function and non-static member function.
 - f. Give four differences between pointer and reference variables.
 - g. Write the general syntax for dynamic allocation and de-allocation of memory for arrays. Consider the following C++ statement that appears outside of a function.

```
int *A = new int[10];
```

Where and how much memory will be allocated when the statement executes? (7×4)
- Q.2**
- a. Write a C++ program to write squares and cubes of natural numbers in a file named 'Table'. (6)
 - b. List any 6 guidelines for functions in C++ to have default arguments. (3)
 - c. Explain with examples the three ways in which a class can be inherited. (9)
- Q.3**
- a. Explain the techniques used to resolve the ambiguities in multiple inheritance. Give suitable examples. (9)

- b. Create a class called 'TIME' that has three integer data members for hours, minutes and seconds. The class should have a constructor to initialize the object to zero and a constructor to initialize the object to some constant value. The class should have member function to add two TIME objects and member function to display time in HH:MM:SS format. Write a main function to create two TIME objects, add them and display the result in HH:MM:SS format. (9)
- Q.4** a. Write a program to read two matrices and add them. Use operator overloading so that the statement for adding the matrices may be written as $Z = X+Y$. Where X and Y are matrices. (12)
- b. Write the operator function to overload the insertion, extraction operators, increment and decrement operators (both prefix and postfix notations). (6)
- Q.5** a. Write a C++ program to read a square matrix and display its transpose. Use pointers to access elements of the matrix. (6)
- b. Under what circumstances the default copy constructor and the default assignment does not work. (6)
- c. Explain how text input and output is performed in C++. (6)
- Q.6** a. What are virtual functions? What are pure virtual functions?. Explain with examples. (8)
- b. Declare the base class Base. Declare and define the virtual function show(). Declare and define the function display(). Create the derived class from the base class. Declare and define the functions display() and show(). Create the base class object and pointer variable. Call the functions display() and show() using the base class object and pointer. Create the derived class object and call the functions display() and show() using the derived class object and pointer. Display suitable messages. (10)
- Q.7** a. Define a function template for finding the minimum value contained in an array. Write main() function to find the minimum value of integer array and minimum value of floating point numbers in an array. (8)
- b. Explain how exceptional handling is done in C++. Write a C++ program for exception handling of divide by zero. (10)