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B. Tech
BCSE 3201

Third Semester Examination – 2008

OBJECT ORIENTED PROGRAMMING USING C++

Full Marks – 70

Time : 3 Hours

*Answer Question No. 1 which is compulsory
and any **five** from the rest.*

*The figures in the right-hand margin
indicate marks.*

1. Answer the following questions : 2×10
- (a) Which library file is included in each C++ program ? Write the #include statement for that file and explain why the file must be included.
- (b) How to read and print one character (including spaces) at a time from keyboard ?

P.T.O.

- (c) What is an abstract class ? Explain the use of abstract base classes in C++.
- (d) List the three ways of passing a parameter (or return value) in C++.
- (e) What is the difference between **cin.get** and **cin.getline** ? Give an example of each.
- (f) What is the application of scope resolution operator :: in C++ ?
- (g) What do you mean by dynamic initialization of Objects ?
- (h) Rewrite the following code segment using a while loop

```
int start, x, total = 0, finish = 100;
for (start = 0; start <= finish; start++)
{
    cin >> x;
    total += x;
    start++;
}
```

- (i) What types of statements ordinarily go in a user-defined class header (.h) file ? Write a statement to include user-defined header file : **definitions.h**?
- (j) Write a statement to ignore all characters up to and including '#' in the buffer. Assume that buffer stores up to 80 characters.

2. (a) Write a C++ function which takes as input a even positive integer n less than 100 and outputs (returns) the sum :
 $2 + 4 + 6 + \dots + n.$ 5
- (b) Write a C++ program, which accepts from the keyboard a name and a date of birth (of the user), checks with the user if these data were accepted correctly, then displays personal greetings to this user, and displays the date when the user was exactly 1 year and 1 month old. 5

3. (a) When do we declare a member of class static ? What is a class ? How does it accomplish data hiding ? 5
- (b) Write a C++ program that contains a main function and *at least* two additional functions to compute the area and perimeter of a square. The program should accept a number corresponding to the side length of the square, and display the area and perimeter of the square on the screen. 5
4. (a) Can class members/methods be private ? Can they be public ? Which ones are accessible to methods outside the class in which they are implemented ? 5
- (b) Given a 2-dimensional $m \times n$ double array **A**. Declare the variable **A**, and write the C++ code required to allocate and

- deallocate the array (assume that m and n are declared and their values are known). 5
5. (a) C++ allows for multiple inheritance which means that a subclass can have more than one superclasses. In this context, the mechanism of virtual inheritance becomes important. Give an example of multiple inheritance where virtual inheritance is essential. Explain. 4
- (b) Write a template function **alloc** that takes two parameters :
- n**: the size of the array to allocate
val: a value of type **T**
- The alloc function should allocate an array of type **T** with n elements, and set all elements in the array to the value **val**. A pointer to the array is returned. 6

6. (a) What is a class ? How does it accomplish data hiding ? Define a **Student** Class with *attributes* and *functions*, that you feel most essential. 5

(b) What file is included to test if character read is alpha-numeric ? Upper-case ? Write code to count how many lower case letters and digits are in a given input ? 5

7. (a) What does polymorphism mean in C++ ? How polymorphism is achieved at compile time and run time ? Give an example of a program that uses polymorphism. 5

(b) Create a class FLOAT that contains one float data member. Overload all the four arithmetic operators so that they operate on the objects of FLOAT. 5

8. (a) What is the differences between structures and classes in C++ ? 2.5

(b) Explain the use of Constructors in C++ program design. 2.5

(c) What is the output from the following segment of C++ code ?

```
int x = 5, y = 7, z = 1;
cout << z << " " << ++x << " " <<
y++;
```

 2.5

(d) What is the difference among public, protected and private members of a class? 2.5