Unique Paper Code   223421102
Name of the Paper   Object Oriented Programming
Name of the Course   MCA
Semester   I

Duration: 3 Hours   Maximum Marks: 70

Instructions for Candidates:

a) Write your Roll No. on the top immediately on the receipt of this question paper.

b) All questions are compulsory.

c) Parts of a question should be attempted together.

Q1. a) Why might one like to make a virtual function "pure"?   (3)
     b) Why does a constructor not have return type?   (2)
     c) Assume a class D derived from a base class B. Class B is a friend of class A. Can class D (5)
        access private data of class A? Justify your answer.

Q2. a) Why can a friend function not be used to overload the assignment operator =?   (5)
     b) Write a C++ program to add two complex objects (complex numbers contain real and   (5)
        imaginary parts) by overloading + operator using friend functions.

Q3. a) Write a program to design a student class representing student roll no. and a test class (5)
        (derived class of student) representing scores of the student in various subjects and
        sports class representing the score in sports. The sports and test class should be
        inherited by a result class having the functionality to add the scores and display the
        final result for a students.
     b) Write a program to demonstrate how can the ambiguity that could arise sometimes in   (5)
        multiple inheritance be resolved?

Q4. a) Write a user-defined function AddEnd4 (int A[][4],int R,int C) in C++ to   (5)
        find and display the sum of all the values, which are ending with 4 (i.e., unit place is 4).

        For example, if the content of array is:

24	16	14
19	5	4

        The output should be
        42

     b) What will be the output produced on execution of the following C++ code: (3)
        Note: Assume all required header files are already being included in
        the program.

```
void main( )
{
        int Ar[ ] = { 6 , 3 , 8 , 10 , 4 , 6 , 7};
        int *Ptr = Ar , I;
        cout<<++*Ptr++ << '@' ;
        I = Ar[3] - Ar[2] ;
```

```
            cout<<++*(Ptr+I)<<'@'<<"\n" ;
            cout<<++I + *Ptr++ << '@' ;
            cout<<*Ptr++ <<'@'<< '\n' ;

            for( ; I >=0 ; I -=2)
                    cout<<Ar[I] << '@' ;
    }
```

c) What will be the output produced on execution of the following C++ code: (2)

```
    typedef char STRING[80];
    void MIXNOW(STRING S)
    {
            int Size=strlen(S);
            for(int I=0;I<Size;I+=2)
            {
                    char WS=S[I];
                    S[I]=S[I+1];
                    S[I+1]=WS;
            }
            for (I=1;I<Size;I+=2)
                    if (S[I]>='M' && S[I]<='U')
                            S[I]='@';
    }
    void main()
    {
            STRING Word="CBSEEXAM2019";
            MIXNOW(Word);
            cout<<Word<<endl;
    }
```

Q5

a) Write a function AOCount () in C++,which should reads each character of a text file IMP.TXT, should count and display the occurrence of alphabets A and O (including small case 'a' and 'o' too).   (5)

b) Write a C++ program to implement a recursive function to return the maximum element in an array.   (5)

Q6

a) Create a class TwoDim which contains x and y coordinates as int. Define the following: (5)
   i)   Default constructor to initialize data members to values passed
   ii)   Parameterized constructor to initialize data members to values passed
   iii)   Function print() to print the coordinates of class

b) What is the sequence of constructors and destructors being called in a multilevel inheritance where class A is parent class of class B, class C is derived class of class B, class D is derived class of class C?   (5)

Q7

a) What is the output when the following code fragment is executed?   (2)

```
    int i = 5, j = 6, k = 7, n = 3;
    cout << i + j * k - k % n << endl;
    cout << i / n << endl;
```

b) Write a function named "`rotate_right`" that takes as its arguments the following: (5)

- an array of floating point values;
- an integer that tells the number of cells in the array;

The function should shift the contents of each cell one place to the right, except for the contents of the last cell, which should be moved into the cell with subscript 0. Thus, for example, if the array passed to the function looks like this:

```
01234 5.8 | 2.6 | 9.1 | 3.4 | 7.0
```

then when the function returns, the array will have been changed so that it looks like this:

```
01234 7.0 | 5.8 | 2.6 | 9.1 | 3.4
```

c) The following code fragment is executed. (3)

```
const int LENGTH = 21;
char message[LENGTH];
cout << "Enter a sentence on the line below." << endl;
cin.getline(message, LENGTH, '\n');
cout << message << endl;
```

- Suppose that in response to the prompt, the interactive user types the following line and presses Enter: Please go away.
  What will the output of the code fragment look like?
- Suppose that in response to the prompt, the interactive user types the following line and presses Enter: Please stop bothering me.
  What will the output of the code fragment look like?