Define the function sort to sort an array of integers. Show step-by-step execution of the above sort function for the following data.

34, 56, 71, 1, 2

6. (a) Write C++ declarations/code for the following :

(i) A function f sum takes three arguments as follows: x, an array of integers, constant y of datatype double, and chi a character reference variable. The return type of the function is void.

(ii) Declare a function fx, that accepts two parameters: A: a pointer to double, B: a 2-dimensional array of integers, and returns a void datatype.

(iii) An array of float B initialized to values 3.4, 5.6, 7.8, 9.1.

(iv) Declare two pointer variables p and q initialized to the address of two float variables x and y. Write statements to increment the value of x and y using p and q.

(v) Write a statement to find the maximum of two numbers, pvalue and rvalue using the ternary operator. (10)

(b) Create a class Box with a static data member, count. Write the class definition that displays the number of objects created and destroyed. (5)

**(2000)**

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[This question paper contains 12 printed pages.]

**Instructions for Candidates**

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

2. **Section A** is compulsory (Question 1).

3. Attempt any **4** questions from **Section B** (Questions **2** to **6**).

4. Parts of a question must be answered together.
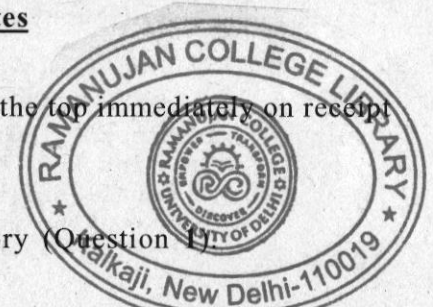
P.T.O.

## Section A

### (Compulsory Question)

1. (a) Write a code snippet to do the following : (3)

  • Declare str, a pointer to char and initialized to the value "NITIN".

  • Display the ASCII value of each character of the pointer str.

  (b) What will be the output after executing the following code segments? Assume all the required header files have been included. (3×6=18)

  (i)
```
double sal[]={3415.5, 6718.8, 7911.5};
double total=0;
for (int k=0; k<3; k++)
    total+=sal[k];
cout << "The total salary is" << total;
```

  (ii)
```
for (int j=1;j<=4;j++)
{
    for(int k=1;k<=j;k=k+2)
      cout<<(j+k);
    cout<<endl;
}
```

```
class first_c
{
    int p;
  protected:
    char s;
  public:
    float q;
    first_c(int p1, char s1, float q1):p(p1), s(s1),
    q(q1){}
};

class second_c: public first_c
{
    double t1;
  public:
    second_c(int i, float j, char l, double p):
    first_c(i,l,j)
    {
      t1=p;
    }
};

void main()
{
    first_c t1(4,'s',4.6f);

    cout<<t1.p;
    cout<<t1.s;
    cout<<t1.q;
    second_c t2(1,3.4f,'y',56.7);
    cout<<t2.p;
    cout<<t2.s;
    cout<<t2.q;
    cout<<t2.t1;
}
```

(b) Consider the following function declaration: (9)

```
void sort(int a[],int n)
{
}
```

(b) Consider the following declaration of the Vector class : (10)

```
class Vector
{
int a[20];
int n;
….

};
```

Rewrite the above class using templates suitably. Also, define the following member functions in the class :

  (i) Default and Copy constructor.

  (ii) void input (int n): This function reads n values in an array.

  (iii) Vector add(....) : This function adds two vector objects element-wise, stores the result in a new vector object, and returns the new vector object.

  (iv) void display() : This function prints elements of the vector.

5. (a) Identify an error in the following code and give reasons for the same. (6)

(iii)
```
char A[]={'R','G','Y','P','\0'};

for(int  k=0;A[k];k++)
{
    switch(A[k])
    {
        case 'R': cout<<"It is red color";
                break;
        case 'G': cout<<"It is   green color";
                break;
        case 'Y': cout<<"It is yellow color";
                break;
        default: cout<<"No color";
    }
}
```

(iv)
```
class Frt
{
    int x,y;
  public:
    Frt(int x,int y)
    {
        cout<<"Inside Frt"<<endl;
        this->x=x;
        this->y=y;
        cout<<this->x<<this->y<<endl;
    }
};

class S_Frt: public Frt
{
    int k;
    public:
    S_Frt(int i,int j,int k1):Frt(i,j)
    {
        cout<<"Inside S_Frt"<<endl;
        k=k1;
        cout<<k;
    }
};

void main()
{
    S_Frt  obj(2,3,4);
}
```

```
(v)  void f1(int& I, int& m)
     {
         I=I+10;

         m=m+15;
     }

     int main()
     {
         int x=40, y=50;
         cout << x << y << endl;
         f1(x,y);
         cout<<x<<y<<endl;
         return 0;
     }


(vi) void exc1(int i)
     {
         try
         {
             if(i%2==0)
                 throw 1;
             else
                 throw 'y';
         }
         catch(int i)
         {
             cout<<"Caught"<<i<<endl;
         }
     }

     int main()
     {
         try
         {
```

```
        cout<<"Figure Constructor";
        area=0;
    }
    virtual void display()=0;
};

class circle: public Figure
{
    double radius;
  public:
    circle(double r)
    {
        cout<<"Inside Circle Constructor"<<endl;
        radius=r;
    }
    void display()
    {
        area=3.14*radius*radius;
        cout<<"The area of circle is"<<area<<endl;
    }
};

class rectangle: public Figure
{
    double length, breadth;
  public:
    rectangle(double l, double b)
    {
        cout<<"Inside Rectangle Constructor"<<endl;
        length=l;
        breadth=b;
    }
    void display()
    {
        area=length*breadth;
        cout<<"The area of rectangle is"<<area<<endl;
    }
};

int main()
{
    circle c1(4.5);
    rectangle r1(5,6);
    c1.display();
    r1.display();
    return 0;
}
```

(ii)  void input() : This function reads values for name, accno and balance from the user.

(iii)  void withdraw (double x): This function debits (subtracts) x from the balance only if the (balance-x) >=500 else the message, "unable to debit, the minimum balance should be 500" is printed.

(iv)  void deposit (double x) : This function credits (adds) x to the balance.

(v)  void display() : This function prints all account details of a given bank account object.

Write a main function to create the Bankaccount objects and illustrate the usage of the above functions.

4.  (a) Give the output of the following code :          (5)

```cpp
class Figure
{
  protected:
    double area;
  public :
    Figure()
    {
```

```cpp
      excl(4);
      excl(5);
  }
  catch(...)
  {
      cout<<"all caught";
  }
  return 0;
}
```

(c) Write the definition for the following function prototype :                                (3)

void concatenate(char a[], char b[], int n, int m)

where n and m are the sizes of the arrays a and b respectively. The function, concatenate appends elements of array b at the end of array a.

(d) Assume all relevant header files are included. Write the main function for the following code to show runtime polymorphism.          (3)

```cpp
class Base
{
public:
virtual void show()
{
cout<<"Inside base B1";
}
};
```

```
class Derived: public Base
{
public:
void show()
{
cout<<"Inside derived";
}
};
void main()
{
.....
.....

}
```

(e) Write a program to copy the content of the file "A1.txt" to another file "A2.txt", word by word. Also, display the number of words copied.

(3)

## Section B

2. (a) Write a program that accepts x and n as input from the command line to compute the following series.

$$s = x - x^3/3! + x^5/5! - x^7/7! + \ldots\ldots$$

where n is the number of terms in the above series. (9)

(b) Rewrite the following code using for and switch statements. Also, give the output of the code. (6)

```
char *ch="hello world";
int countv=0,countalp=0;
int i=0;
while(ch[i])
{
  if(ch[i]=='a' ||   ch[i]=='e' || ch[i]=='i' ||
ch[i]=='o' || ch[i]=='u')
    countv++;
  else
    countalp++;
  i++;
}
cout<<countv<<endl;
cout<<countalp;
```

3. Consider the following class : (15)

```
class Bankaccount
{
......
};
```

Declare data members name, accno and balance of appropriate data types for the class Bankaccount. Define its member functions to perform the task mentioned below :

(i) Default and parameterized constructors to initialize data members of the class Bankaccount.