DATA STRUCTURES LAB

LAB RECORD

Submitted by

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LAB:-1(Revisit C/C++)

Q :- WAP to find out largest element of an array.

*//***

//This program is written by Manan Jain(Enrollment no.211B173)

*//***

Ans:-

```
#include<iostream>
using namespace std;
void largest(int arr[],int n)
{
    int max;
    max=arr[0];
    for(int i=1;i<n;i++)
    {
        if(arr[i]>max)
        {
            max=arr[i];
        }
    }
    cout<<"maximum element in array = "<<max;
}
int main()
{
    int n;
    cout<<"input the size of an array = ";
    cin>>n;
    int a[n];
    cout<<"input the element in array = ";
    for(int i=0;i<n;i++)
    {
```

```
        cin>>a[i];
    }
    largest(a,n);
    return 0;
}
```

Q :- WAP to search an element in array.

```
//*************************************************
//This program is written by Manan Jain(Enrollment no. 211B173)
//*************************************************
```

Ans:-

```
#include<iostream>
using namespace std;
void search(int arr[],int n ,int x)
{
    int k=0;
    for(int i=0;i<n;i++)
    {
        if(a[i]==x)
        {
            cout<<"given number is present in array at "<<i+1<<" position"<<endl;
            k=1;
        }
    }
    if(k==0)
    {
        cout<<"given number is   not present in array";
    }
}
int main()
{
    int n,a;
    cout<<"input the size of the array = ";
```

```
    cin>>n;
    int arr[n];
    cout<<"input the element in array = ";
    for(int i=0;i<n;i++)
    {
        cin>>x[i];
    }
    cout<<"input the number you want to search = ";
    cin>>a;
    search(arr,n,a);
    return 0;
}
```

Q:- WAP to check whether the number is prime or not.

```
//*****************************************************
```

//This program is written by Manan Jain(Enrollment no. 211B173)

```
//*****************************************************
```

Ans:-

```
#include<iostream>
using namespace std;
void check(int n)
{
  int k = 0;
  if ((n == 0) || (n == 1))
    {    k = 0;   }
  for (int i = 2; i < n; i++)
    {
      if ((n % i) == 0)
        {
          k = 1;
        }
    }
  if (k == 1)
```

```
    {
      cout << "number is not prime";
    }
  else
    {
      cout << "number is prime";
    }
}

int main ()
{
  int n, a;
  cout << "input the number you want to check = ";
  cin >> n;
  check(n);
  return 0;
}
```

Q :- WAP to calculate x^y where x and y are two integer numbers entered by the user.

```
//*********************************************************
//This program is written by Manan Jain(Enrollment no. 211B173)
//*********************************************************
```

Ans:-

```
#include<iostream>
using namespace std;
void   power(int x, int y)
{
  int z = 1;
  for (int i = 0; i < y; i++)
    {
      z = z * x;
    }
  cout << "value of " << x << "^" << y << " = " << z;
```

```
}

int main ()
{
  int a, b;
  cout << "input the number = ";
  cin >> a;
  cout << "input the other number   = ";
  cin >> b;
  power(a, b);
  return 0;
}
```

Q:-WAP to replace a character by another character in a string . take both the choices from the user.

```
//*************************************************
//This program is written by Manan Jain(Enrollment no. 211B173)
//*************************************************
```

Ans:-

```
#include<iostream>
#include<string>
using namespace std;
string exchange(string s, char c, char r)
{
    int l = s.size();
    for(int i=0;i<l;i++)
    {
        if(s[i]==c)
            s[i]= r;
    }
    return s;
}
int main()
{
```

```
    string s;
    char c,r;
    cout<<"Enter string = ";
    cin>>s;
    cout<<"Enter charcter of string = ";
    cin>>c;
    cout<<"Enter character to replace   = ";
    cin>>r;
    s = exchange(s,c,r);
    cout<<s;
    return 0;
}
```

Q :- WAP to find the reverse of given string.

```
//*****************************************************
//This program is written by Manan Jain(Enrollment no. 211B173)
//*****************************************************
```

Ans:-

```
#include<iostream>
using namespace std;
void reverse_string(string a)
{
    string b;
    int s = a.size();
    for(int i=0;i<s; i++)
    {
        cout<<a[s-i-1];
    }
}
int main()
{
```

```
    string a;
    cout<<"Enter string to reverse it = ";
    cin>>a;
    reverse_string(a);
    return 0;
}
```

Q :- WAP to sort the array and ask the choice from user for ascending /descending.

```
//*******************************************************
//This program is written by Manan Jain(Enrollment no. 211B173)
//*******************************************************
```

Ans:-

```
#include <iostream>
using namespace std;
void Ascending()
{
   int i, j, n, temp,x;
    cout << "Enter the total no. of elements: ";
    cin >>n;
    int arr[n];
    cout << "Enter the elements of the array: " << endl;
    for (i = 0; i < n; i++){
        cin >> arr[i];
    }
        for (i = 0; i < n; i++)
        {
          for (j = i; j < n; j++)
          {
            if (arr[i] > arr[j+1])
            {
                temp = arr[i];
```

```
                arr[i] = arr[j+1];
                arr[j+1] = temp;
            }
          }
        }
        cout << "Elements sorted in the ascending order are =   " << endl;
      for (i = 1; i <= n; i++)
      {
       cout << arr[i] << "\t";
      }

}
void Descending()
{
    int i, j, n, temp,x;
    cout << "Enter the total no. of elements: ";
    cin >> n;
    int arr[n];
    cout << "Enter the elements of the array: " << endl;
    for (i = 0; i < n; i++)
    {
        cin >> arr[i];
    }
    for(i=0;i<n;i++)
            {
              for(j=i+1;j<n;j++)
              {
                  if(arr[i]<arr[j])
                  {
                      temp   =arr[i];
                      arr[i]=arr[j];
                      arr[j]=temp;
```

```
                    }
                }
            }
            cout<<"Sorted Array elements:"<<endl;
           for(i=0;i<n;i++)
                cout<<arr[i]<<"\t";
}
int main()
{
    int temp,x;
    cout<<"input 1 for Ascending Order and 2 for Descending Order = ";
    cin>>x;
    if(x==1)
    {
        Ascending();
    }
    else
    {
        Descending();
    }
    return 0;
}
```

Q :- WAP to concatenate two strings using pointer.

```
//*************************************************
//This program is written by Manan Jain(Enrollment no. 211B173)
//*************************************************
```

Ans:-

```
#include <iostream>
using namespace std;
void Concatenate()
{
    int x,y;
```

```
    cout<<"input the size of first and second string respectively = ";
    cin>>x>>y;
    char str1[x], str2[y];
    char * s1 = str1;
    char * s2 = str2;
    cout<<"Enter 1st string: ";
    cin>>str1;
    cout<<"Enter 2nd string: ";
    cin>>str2;
    while(*(++s1));
    while(*(s1++) = *(s2++));
    cout<<"Concatenated string:"<<str1;
}
int main()
{
    Concatenate();
  return 0;
  }
```

Q :- WAP to create a dynamic array of user desired size and search an element in that array.

```
//*************************************************
//This program is written by Manan Jain(Enrollment no. 211B173)
//*************************************************
```

Ans:-

```
#include<iostream>
using namespace std;
void search(int a[],int n,int x)
{
        int k=0;
    for(int i=0;i<n;i++)
    {
        if(a[i]==x)
        {
```

```
            cout<<"Given number   is present in array at "<<i+1<<" position"<<endl;
            k=1;
        }
    }
    if(k==0)
    {
        cout<<"Given number is not present in array";
    }

}
int main()
{
    int n,a;
    cout<<"input the size of the array = ";
    cin>>n;
    int   *arr=(int*)malloc(n*sizeof(int));
    for(int i=0;i<n;i++)
    {
        cin>>arr[i];
    }
    cout<<"input the number you want to search in array = ";
    cin>>a;
    search(arr,n,a);
    return 0;
}
```

Q:- WAP to calculate difference between two time periods using the C structures.

```
//*************************************************
//This program is written by Manan Jain(Enrollment no. 211B173)
//*************************************************
```

Ans:-

```
#include<iostream>
using namespace std;
```

```
struct time_period
{
int seconds;
int minutes;
int hours;
};
void difference(struct time_period start, struct time_period stop, struct time_period *diff)
{
    if(stop.seconds > start.seconds)
{
  start.minutes=start.minutes-1;
  start.seconds += 60;
}
  diff->seconds = start.seconds - stop.seconds;
if(stop.minutes > start.minutes)
{
  start.hours=start.hours-1;
  start.minutes += 60;
}
  diff->minutes = start.minutes - stop.minutes;
  diff->hours = start.hours - stop.hours;
}
int main()
{
    struct time_period startTime, stopTime, diff;
    cout<<"Enter starting time = "<<endl<<"Enter hours, minutes and seconds respectively = ";
    cin>>startTime.hours>>startTime.minutes>>startTime.seconds;
    cout<<"Enter stop time = "<<endl<<"Enter hours, minutes and seconds respectively =  ";
    cin>>stopTime.hours>>stopTime.minutes>>stopTime.seconds;
    difference(startTime, stopTime, &diff);
    cout<<"Time diference = "<<diff.hours<<diff.minutes<<diff.seconds;
    return 0;
```

}

Q:- WAP to add two complex numbers by passing structure to a function.

```
//*****************************************************
//This program is written by Manan Jain(Enrollment no. 211B173)
//*****************************************************
```

Ans:-

```
#include <iostream>
using namespace std;
struct complex {
    float real;
    float imag;
};
complex add(complex num1,complex num2) {
    complex temp;
    temp.real = num1.real + num2.real;
    temp.imag = num1.imag + num2.imag;
    return(temp);
}
int main() {
    complex num1, num2, sum;
    cout << "Enter real part of Complex Number 1: " << endl;
    cin >> num1.real;
    cout << "Enter imaginary part of Complex Number 1: " << endl;
    cin >> num1.imag;
    cout << "Enter real part of Complex Number 2: " << endl;
    cin >> num2.real;
    cout << "Enter imaginary part of Complex Number 2: " << endl;
    cin >> num2.imag;
    sum = add(num1, num2);
    if(sum.imag >= 0)
    cout << "Sum of the two complex numbers is "<< sum.real <<" + "<< sum.imag <<"i";
    else
```

```
    cout << "Sum of the two complex numbers is "<< sum.real <<" + ("<< sum.imag <<")i";
    return 0;
}
```

Lab Exercise :- 02(Revisit C/C++)

Q). WAP to generate a Fibonacci series up to n terms.

```
//*************************************************
//This program is written by Manan Jain(Enrollment no. 211B173)
//*************************************************
#include <iostream>
using namespace std;
void fibonacci(int n)
{
	int f[n];
	f[0] = 0;
	f[1] = 1;
	for(int i=2;i<n;i++)
	{
		f[i] = f[i-1] + f[i-2];
	}
	for(int i =0;i<n;i++)
	{
		cout<<f[i]<<", ";
	}
}
int main()
{
	int n;
	cout<<"Input number of terms = ";
	cin>>n;
	fibonacci(n);
```

```
    return 0;
}
```

Q) . WAP to find out series sum of 1^2 + 2^2 + …. + n^2 .

```
//*************************************************
//This program is written by Manan Jain(Enrollment no. 211B173)
//*************************************************
#include<iostream>
#include <math.h>
using namespace std;
void sum(int n)
{
    Return ((n)(n+1)(2n+1))/6
}
int main()
{
    int n;
    cout<<"Input number of terms = ";
    cin>>n;
    cout<<"The Sum is :"<<sum(n);
    return 0;
}
```

Q). WAP to find out GCD of two numbers.

```
//*************************************************
//This program is written by Manan Jain(Enrollment no. 211B173)
//*************************************************
#include <iostream>
```

```
using namespace std;
void gcd(int a,int b)
{
	int g;
	if(a<b)
		g = a;
	else
		g =b;
	while(g>0)
	{
		if(a%g==0 && b%g ==0)
			break;
		g--;
	}
	cout<<"The GCD of "<<a<<" and "<<b<<" = "<<g;
}
int main()
{
	int a,b;
	cout<<"Enter two number to find gcd = ";
	cin>>a>>b;
	gcd(a,b);
	return 0;
}
```

Q).WAP to multiply two numbers by using addition.

```
//*****************************************************
//This program is written by Manan Jain(Enrollment no. 211B173)
//*****************************************************
#include <iostream>
```

```
using namespace std;
void multi(int a , int b)
{
	int m = 0;
	for(int i=0;i<b;i++)
	{
		m = m+ a;
	}
	cout<<"THe multiplication of "<<a<<" and "<<b<<" = "<<m;
}
int main()
{
	int a,b;
	cout<<"Enter two numbers to multiply = ";
	cin>>a>>b;
	multi(a,b);
	return 0;
}
```

Q).WAP to convert a binary number into decimal

```
//*************************************************
//This program is written by Manan Jain (Enrollment no. 211B173)
//*************************************************
#include <iostream>
#include <math.h>
using namespace std;
void btod(long int b)
{
	int d ,r,q = 0,j =0;
```

```
    int n = b;
    while(b>0)
    {
        r = b%10;
        b = b/10;
        q = q + r* pow(2,j);
        j++;
    }
    cout<<"decimal conversion of "<<n<<" = "<<q;
}
int main()
{
    long int b;
    cout<<"Enter binary number to convert = ";
    cin>>b;
    btod(b);
    return 0;
}
```

Q).WAP to convert a decimal into binary number.

```
//************************************************
//This program is written by Manan Jain(Enrollment no. 211B173)
//************************************************
#include <iostream>
#include <math.h>
using namespace std;
void dtob(int a)
{
    int r[32],n = a, j=0;
```

```
        while(n>0)
        {
                r[j] = n%2;
                n = n/2;
                j++;
        }
          cout<<"Binary conversion of "<<a<<" = ";
        for(int i = j-1;i>=0;i--)
        {
                cout<<r[i];
        }

}
int main()
{
        int a;
        cout<<"Enter decimal number to convert in binary = ";
        cin>>a;
        dtob(a);
        return 0;
}
```

Q).WAP to display lower triangular matrix of a given n by n size matrix entered by user.

```
//************************************************
//This program is written by Manan Jain(Enrollment no. 211B173)
//************************************************
#include <iostream>
using namespace std;
```

```
void lowertriangle()
{
    int n;
    cout<<"Enter size = ";
    cin>>n;
    int a[n][n];
    cout<<"Enter values in matrix = "<<endl;
    for(int i =0;i<n;i++)
    {
        for(int j =0;j<n;j++)
            cin>>a[i][j];
    }
    for(int i =0;i<n;i++)
    {
        for(int j=0;j<n;j++)
        {
            if(i<j)
                cout<<"0"<<" ";
            else
                cout<<a[i][j]<<" ";
        }
        cout<<endl;
    }
}
int main()
{

    lowertriangle();
```

```
	return 0;
}
```

Q).WAP to find out nCr factor of given numbers

```
//*************************************************
//This program is written by Manan Jain(Enrollment no. 211B173)
//*************************************************
#include <iostream>
using namespace std;
int fact(int n)
{     if(n==0)
		return 0;
	if(n==1)
		return 1;
	else
		return n*fact(n-1);
}
void combinations(int n, int r)
{
	int f,c = n-r;
	f = fact(n)/(fact(c)*fact(r));
	cout<<"the factor of given number = "<<f;
}
int main()
{	int n,r;
	cout<<"Enter n and r to find factor of combinations = ";
	cin>>n>>r;
	combinations(n,r);
	return 0;    }
```