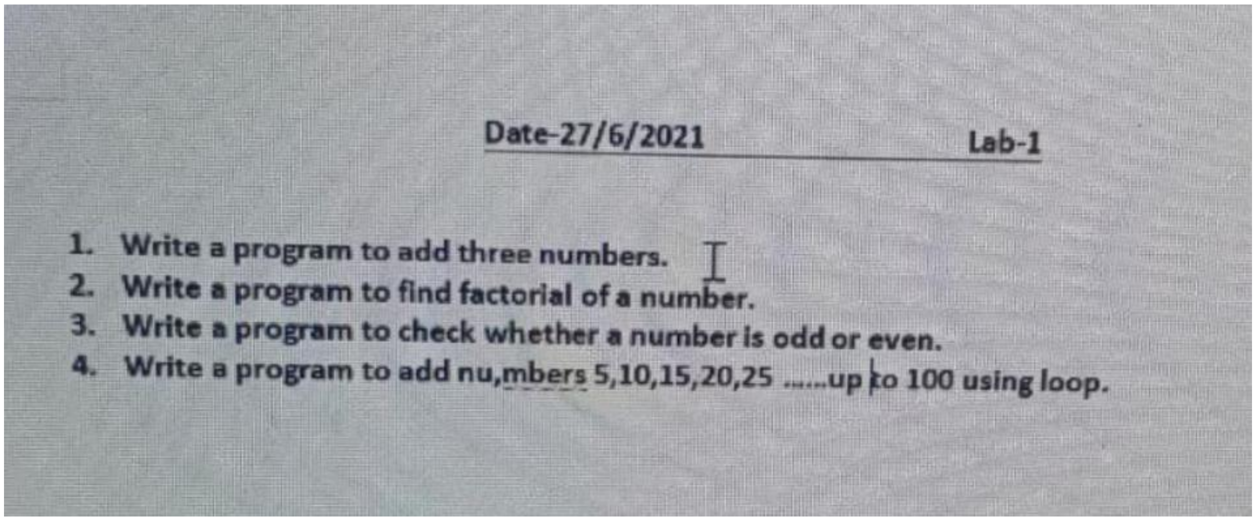
Data Structure and Algorithms

(Mid-sem submission)

Lab 1


Date-27/6/2021 Lab-1

1. Write a program to add three numbers.
2. Write a program to find factorial of a number.
3. Write a program to check whether a number is odd or even.
4. Write a program to add nu,mbers 5,10,15,20,25 ......up to 100 using loop.

Date:- 26_7_2021

Q.

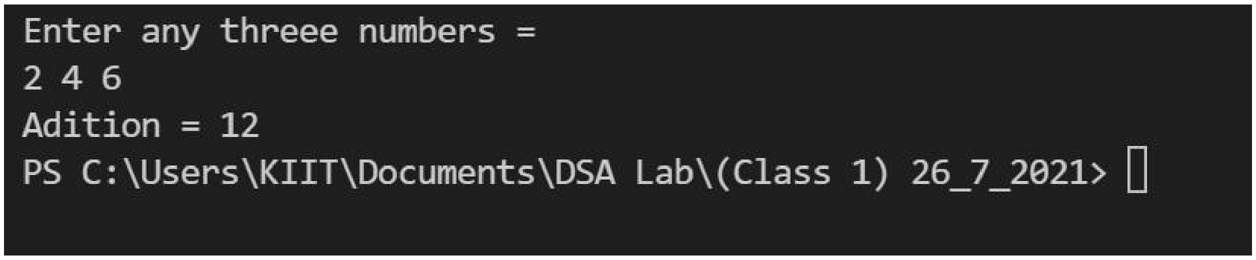
1.

Code:-

// In 1 st lab teacher said to code in language in which we are COMFORTABLE so therefore only lab1 is in c++ language

```
#include<iostream>   //By Anusthan Singh (20051337)
using namespace std;

int addition(int a, int b, int c);
int main(){

    float num1,num2,num3,add;

    cout<<"Enter any threee numbers =\n";
    cin>>num1>>num2>>num3;
    add=addition(num1,num2,num3);

    cout<<"Adition = "<<add;

return 0;
}

int addition(int a, int b, int c){
    float sum =(a+b+c);

    return sum;
}
```

Output:-

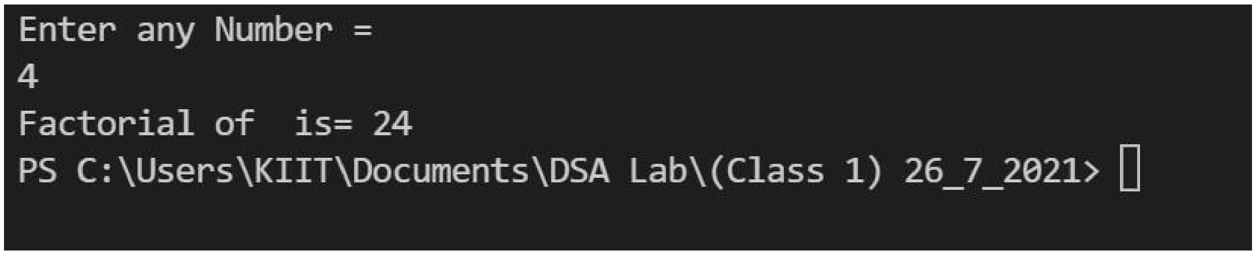


```
Enter any threee numbers =
2 4 6
Adition = 12
PS C:\Users\KIIT\Documents\DSA Lab\(Class 1) 26_7_2021>
```

Q2.

```
#include<iostream>
using namespace std; //By Anusthan Singh (20051337)

int factorical(int a);
int main()
{
     int fact=1,n;
     cout<<"Enter any Number =\n";
     cin>>n;

     fact= factorical(n);

    cout<<"Factorial of  is= "<<fact<<endl;
  return 0;
}
int factorical(int a){
    int i,fact=1;
for(i=1;i<=a;i++){
      fact=fact*i;
     }
     return fact;
}
```

Output:-

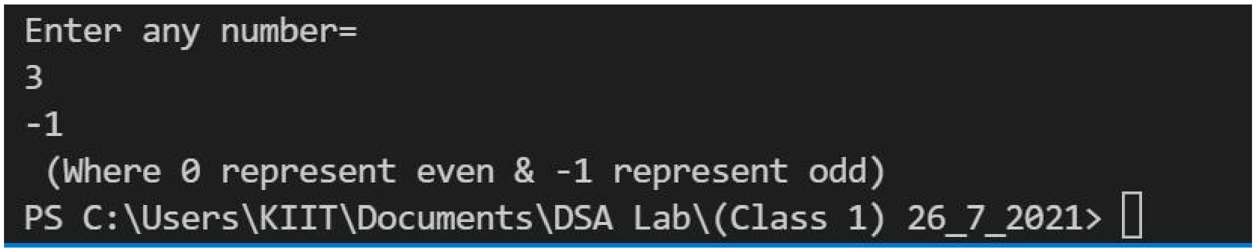


```
Enter any Number =
4
Factorial of  is= 24
PS C:\Users\KIIT\Documents\DSA Lab\(Class 1) 26_7_2021> 
```

Q3.

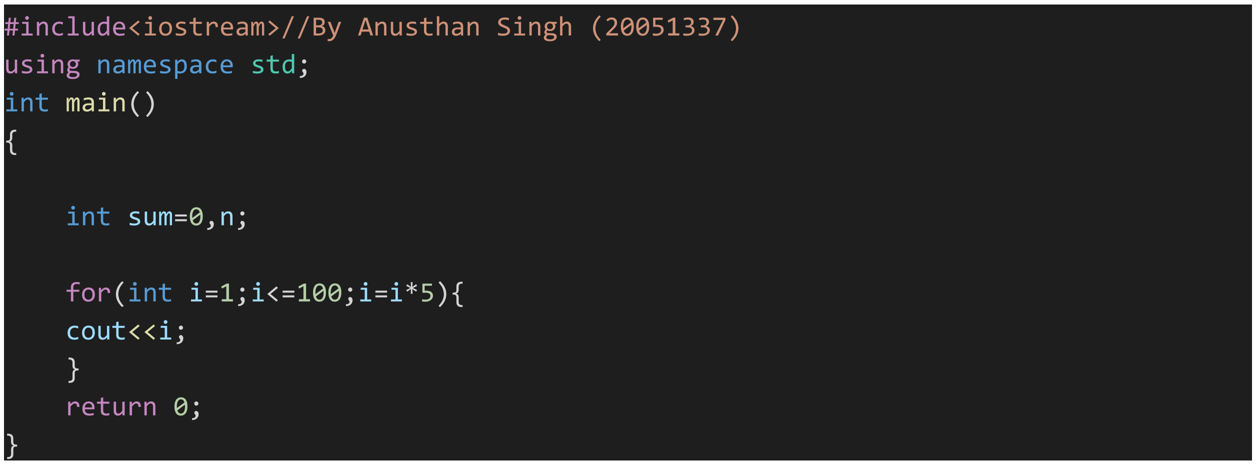
```
#include<iostream>//By Anusthan Singh (20051337)
using namespace std;

int even_odd(int num);
int main(){
    int n, ans;
    cout<<"Enter any number= \n";
    cin>>n;

    ans= even_odd(n);
    cout<<ans<<"\n (Where 0 represent even & -1 represent odd) ";

    return 0;
    }

    int even_odd(int num){
        if(num%2==0){
            return 0;
        }
        else
        return -1;
    }
```

Output:-



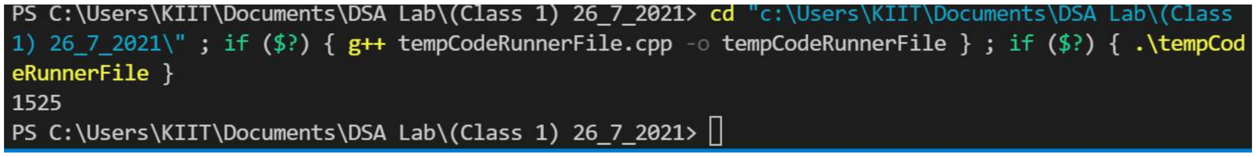
```
Enter any number=
3
-1
 (Where 0 represent even & -1 represent odd)
PS C:\Users\KIIT\Documents\DSA Lab\(Class 1) 26_7_2021> 
```

Q4.



```
#include<iostream>//By Anusthan Singh (20051337)
using namespace std;
int main()
{

    int sum=0,n;

    for(int i=1;i<=100;i=i*5){
    cout<<i;
    }
    return 0;
}
```

Output:-

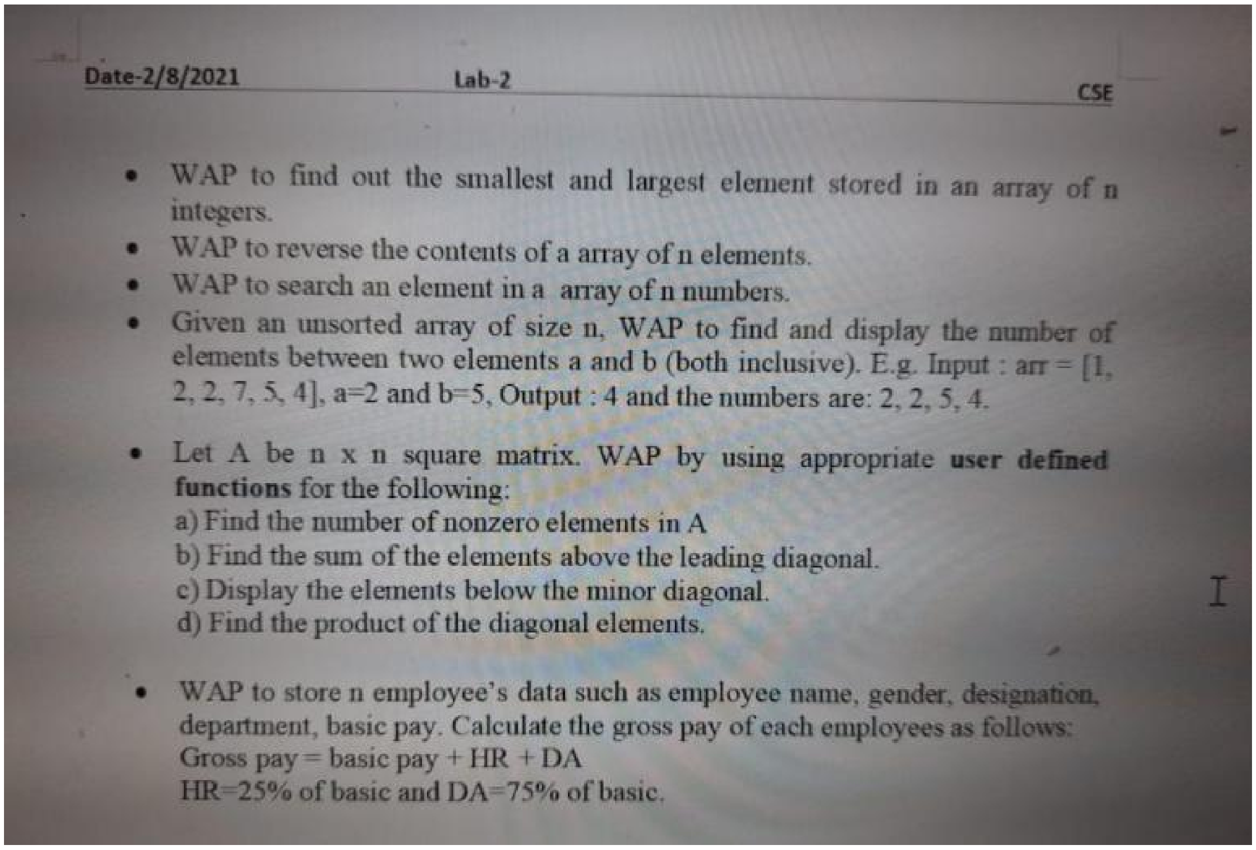


```
PS C:\Users\KIIT\Documents\DSA Lab\(Class 1) 26_7_2021> cd "c:\Users\KIIT\Documents\DSA Lab\(Class
1) 26_7_2021\" ; if ($?) { g++ tempCodeRunnerFile.cpp -o tempCodeRunnerFile } ; if ($?) { .\tempCod
eRunnerFile }
1525
PS C:\Users\KIIT\Documents\DSA Lab\(Class 1) 26_7_2021> 
```

Lab 2

Date:- 2/8/2021

Q



Date-2/8/2021 Lab-2 CSE

- WAP to find out the smallest and largest element stored in an array of n integers.
- WAP to reverse the contents of a array of n elements.
- WAP to search an element in a array of n numbers.
- Given an unsorted array of size n, WAP to find and display the number of elements between two elements a and b (both inclusive). E.g. Input : arr = [1, 2, 2, 7, 5, 4], a=2 and b=5, Output : 4 and the numbers are: 2, 2, 5, 4.
- Let A be n x n square matrix. WAP by using appropriate **user defined functions** for the following:
  a) Find the number of nonzero elements in A
  b) Find the sum of the elements above the leading diagonal.
  c) Display the elements below the minor diagonal.
  d) Find the product of the diagonal elements.
- WAP to store n employee's data such as employee name, gender, designation, department, basic pay. Calculate the gross pay of each employees as follows:
  Gross pay = basic pay + HR + DA
  HR=25% of basic and DA=75% of basic.

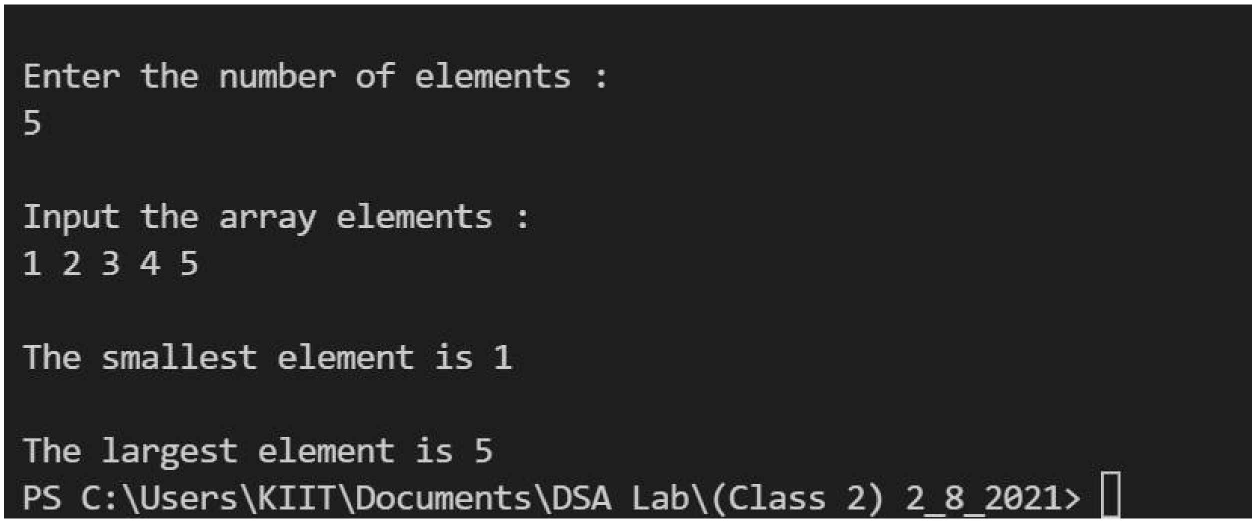
1.

Code:-

```
#include<stdio.h>//By Anusthan Singh (20051337)

int main()
{
int a[50],i,n,large,small;

printf("\nEnter the number of elements :\n");
scanf("%d",&n);
printf("\nInput the array elements :\n");

for(i=0;i<n;++i)
scanf("%d",&a[i]);

large=small=a[0];

 for(i=1;i<n;++i)
{
 if(a[i]>large)
```

```c
large=a[i];

 if(a[i]<small)
small=a[i];
}
printf("\nThe smallest element is %d\n",small);
printf("\nThe largest element is %d\n",large);

return 0;
}
```

Output:-



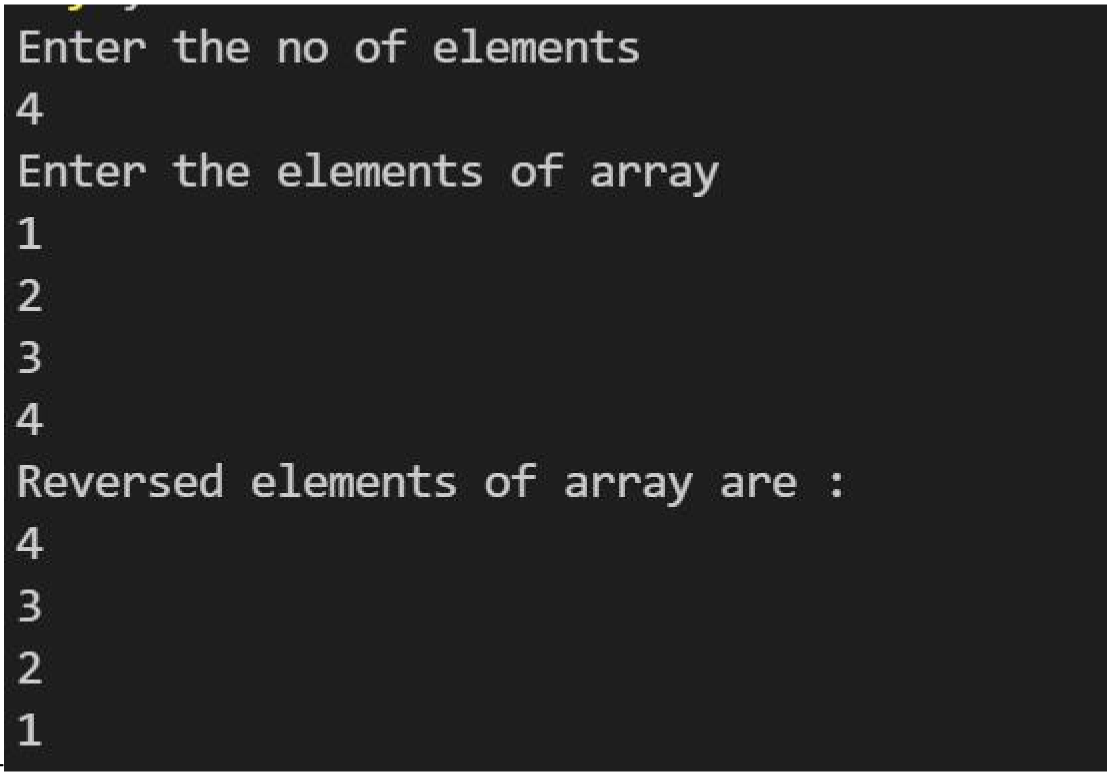
```
Enter the number of elements :
5

Input the array elements :
1 2 3 4 5

The smallest element is 1

The largest element is 5
PS C:\Users\KIIT\Documents\DSA Lab\(Class 2) 2_8_2021>
```

Q2.

```c
#include <stdio.h>
#include <stdlib.h>

int main(void)
{
    int n;
    printf("Enter the no of elements int the array = ");
    scanf("%d",&n);
    int arr[n];
    printf("\n Enter the elements of array = \n");
    for(int i=0;i<n;i++)
```

```
     {scanf("%d",&arr[i]);}
    printf("Reversed format of the  array are = \n");
    for(int i=n-1;i>=0;i--)
     {printf("%d \n",arr[i]);}
}
```

Output:-



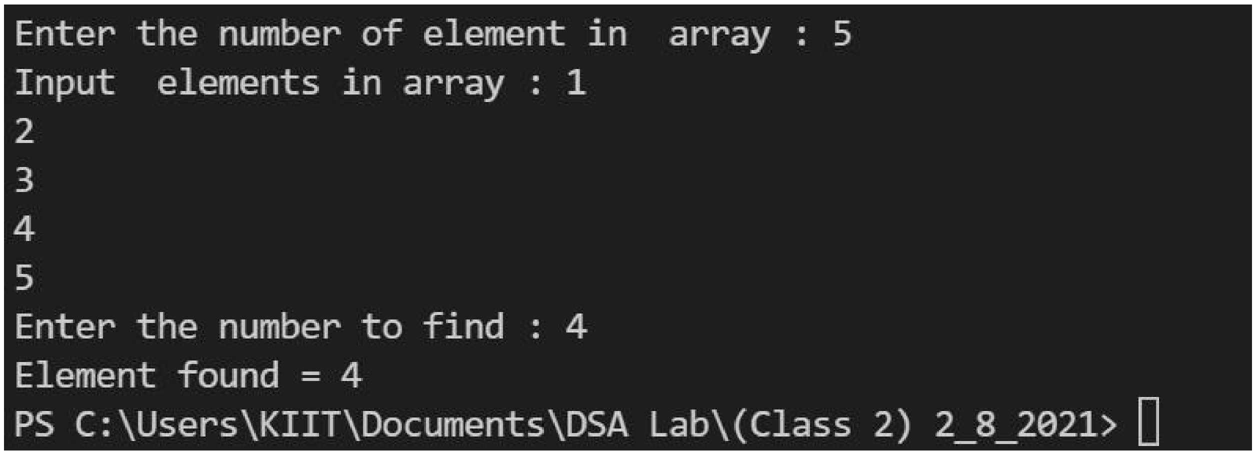
```
Enter the no of elements
4
Enter the elements of array
1
2
3
4
Reversed elements of array are :
4
3
2
1
```

Q3.

Code:-

```
#include <stdio.h>//By Anusthan Singh (20051337)
#include <conio.h>

int main()
{
    int a[10000],i,n,found;

    printf("Enter the number of element in  array : ");
    scanf("%d", &n);
    printf("Input  elements in array : ");
    for(i=0; i<n; i++)
    {
        scanf("%d",&a[i]);
    }
     printf("Enter the number to find : ");
    scanf("%d", &found);

    for(i=0; i<n; i++)
    {
        if(a[i]==found)
        {
            printf("Element found = ");
             printf("%d",found);
            return 0;
        }
    }

    }
```

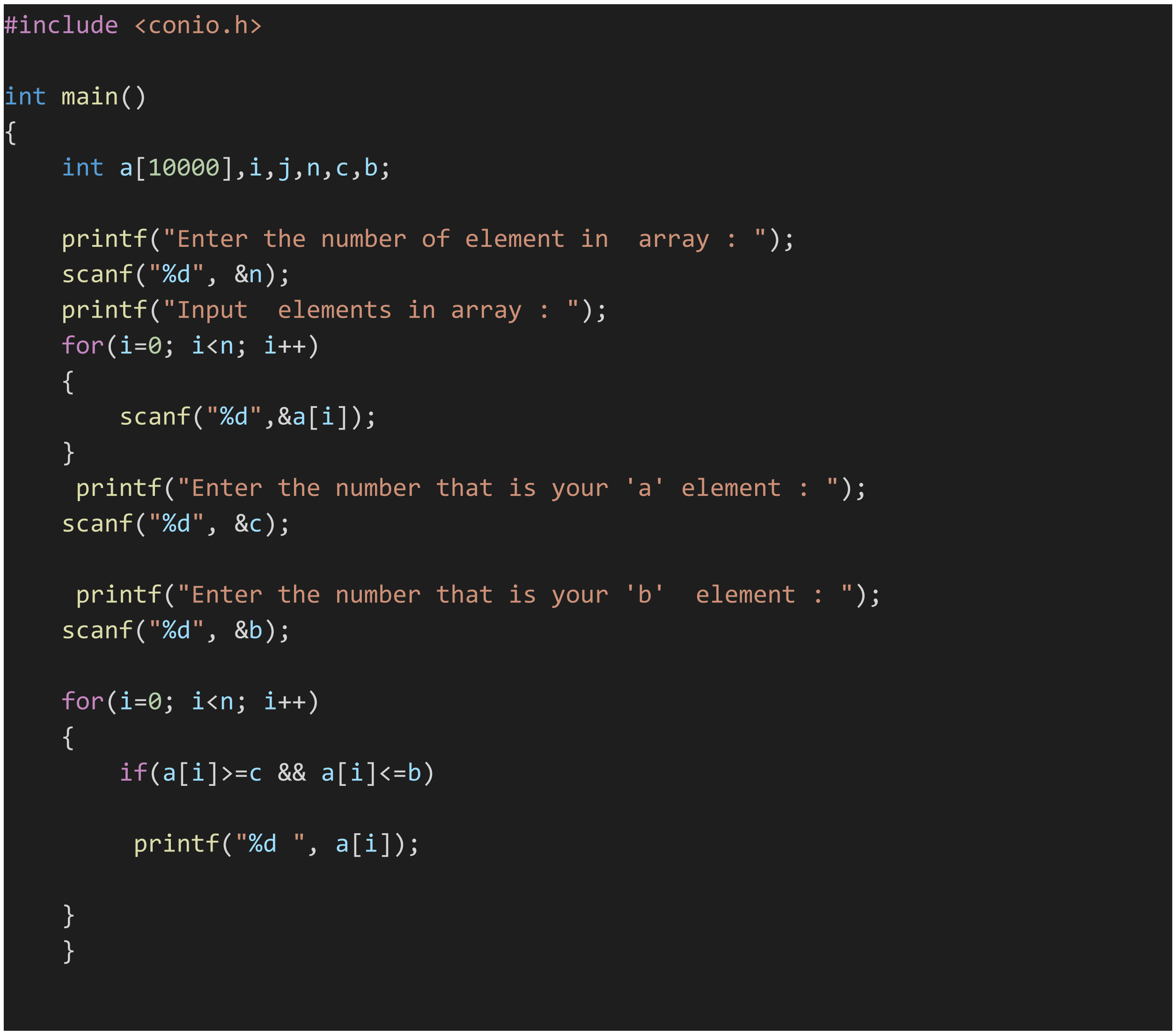
Output:-



```
Enter the number of element in  array : 5
Input  elements in array : 1
2
3
4
5
Enter the number to find : 4
Element found = 4
PS C:\Users\KIIT\Documents\DSA Lab\(Class 2) 2_8_2021> 
```

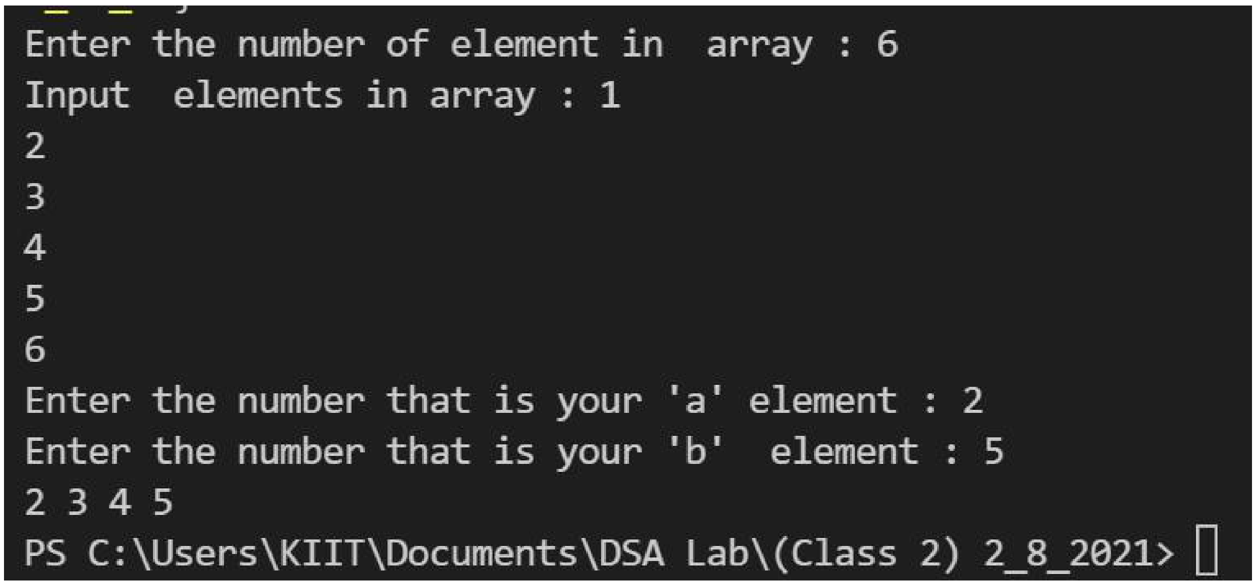
Q4.

```
#include <stdio.h>//By Anusthan Singh (20051337)
```



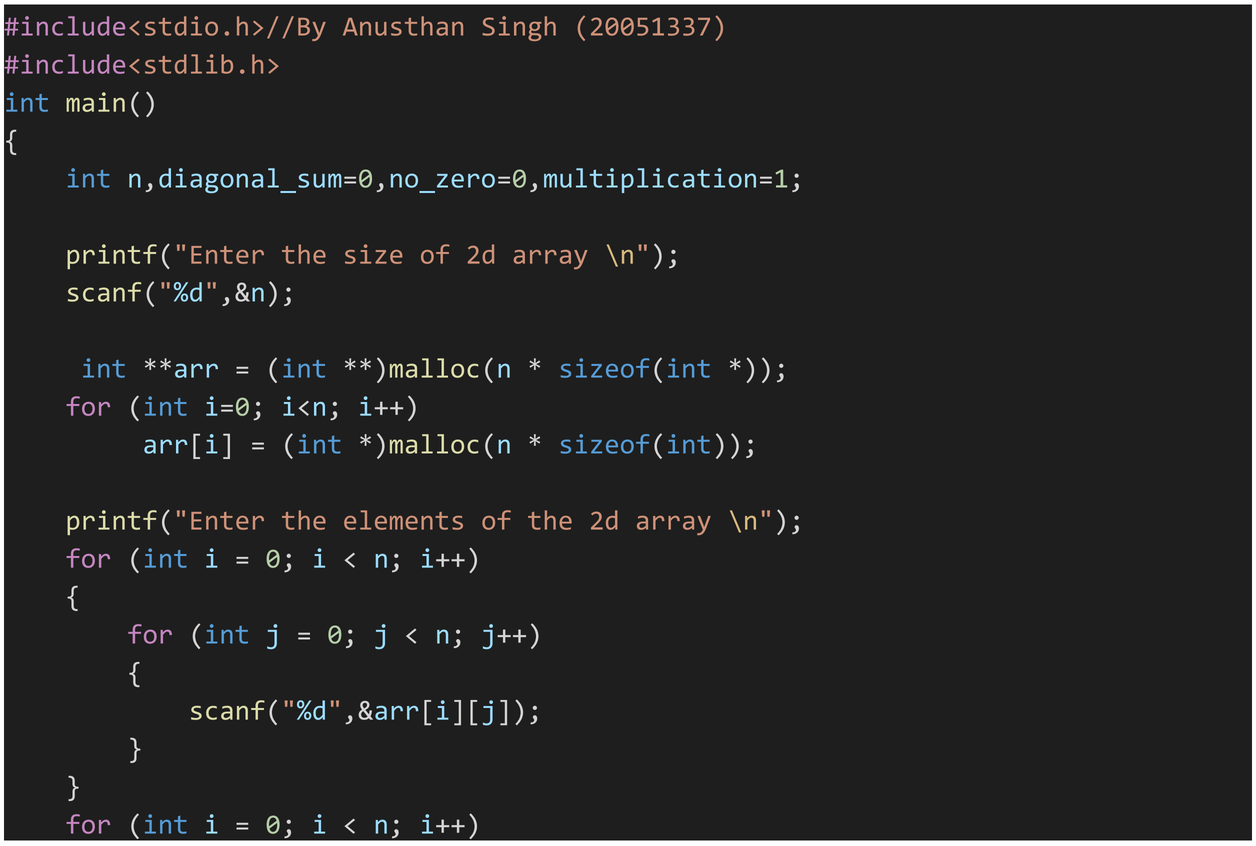
```c
#include <conio.h>

int main()
{
    int a[10000],i,j,n,c,b;

    printf("Enter the number of element in  array : ");
    scanf("%d", &n);
    printf("Input  elements in array : ");
    for(i=0; i<n; i++)
    {
        scanf("%d",&a[i]);
    }
     printf("Enter the number that is your 'a' element : ");
    scanf("%d", &c);

     printf("Enter the number that is your 'b'  element : ");
    scanf("%d", &b);

    for(i=0; i<n; i++)
    {
        if(a[i]>=c && a[i]<=b)

         printf("%d ", a[i]);

    }
    }
```

Output:-



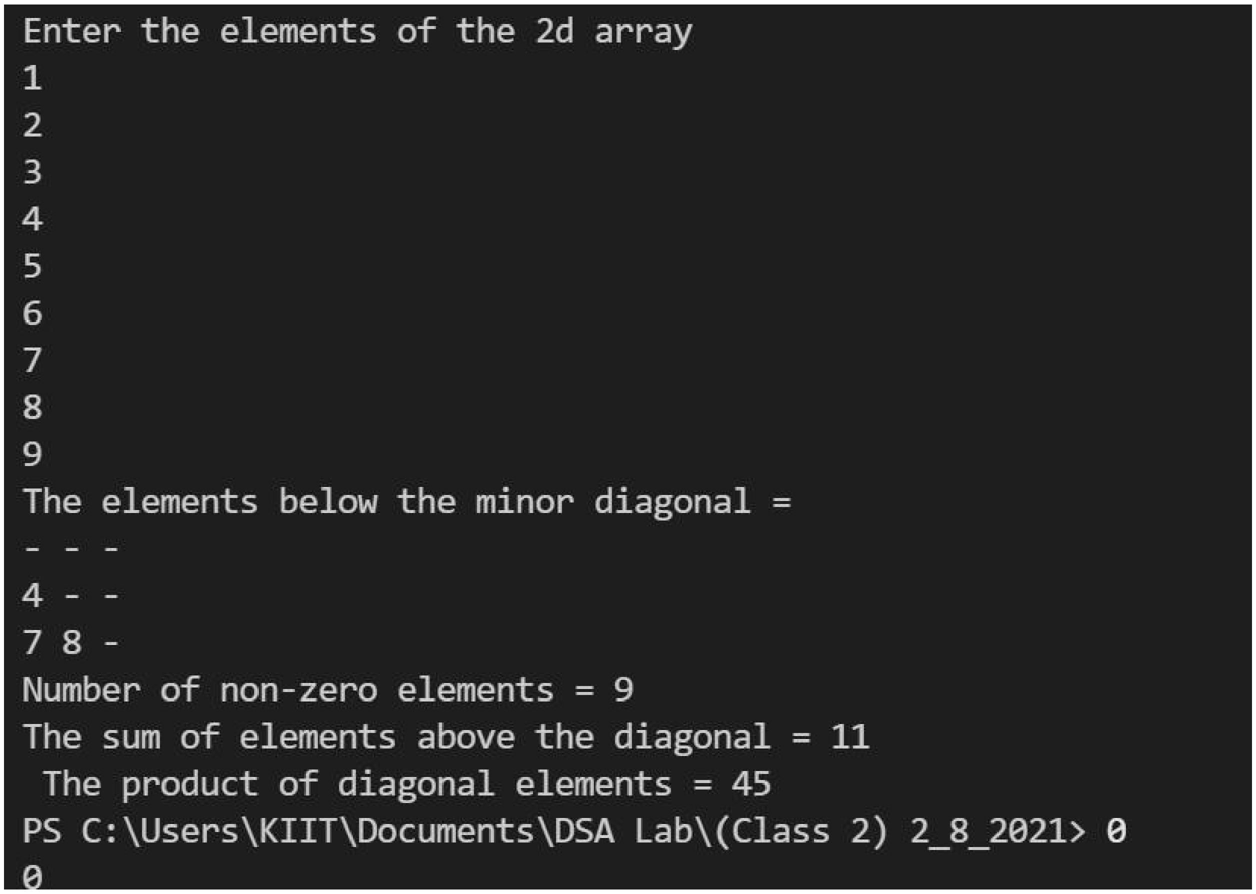
```
Enter the number of element in  array : 6
Input  elements in array : 1
2
3
4
5
6
Enter the number that is your 'a' element : 2
Enter the number that is your 'b'  element : 5
2 3 4 5
PS C:\Users\KIIT\Documents\DSA Lab\(Class 2) 2_8_2021>
```

Q5



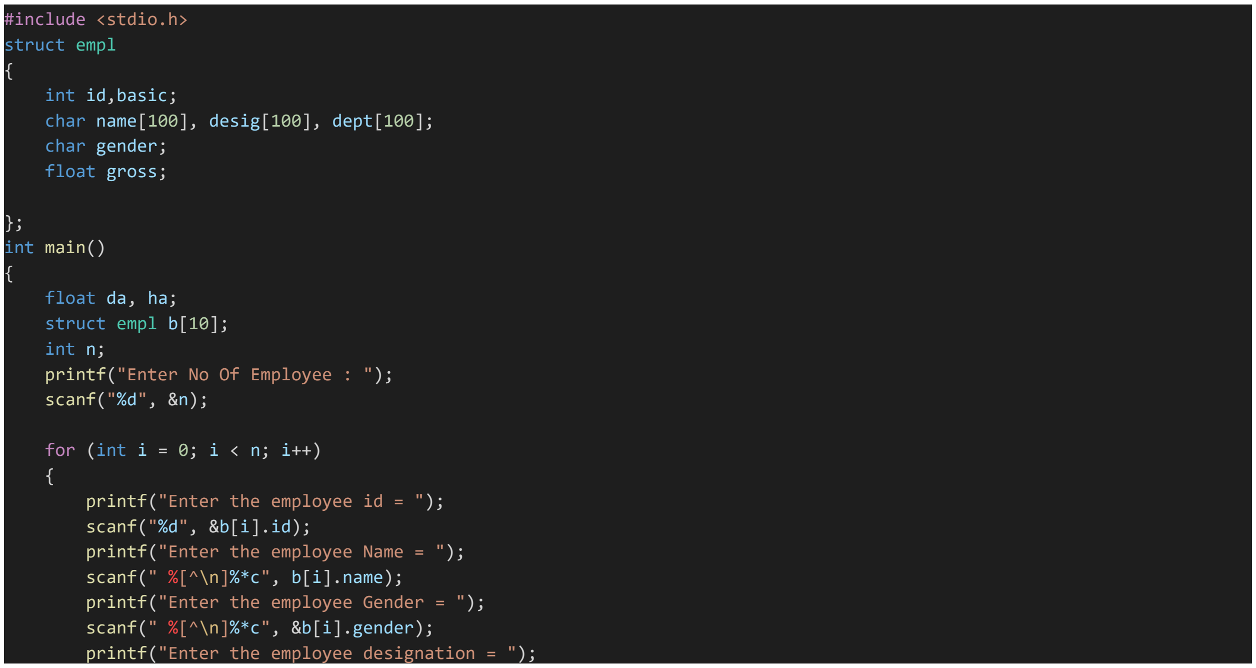
```c
#include<stdio.h>//By Anusthan Singh (20051337)
#include<stdlib.h>
int main()
{
    int n,diagonal_sum=0,no_zero=0,multiplication=1;

    printf("Enter the size of 2d array \n");
    scanf("%d",&n);

     int **arr = (int **)malloc(n * sizeof(int *));
    for (int i=0; i<n; i++)
         arr[i] = (int *)malloc(n * sizeof(int));

    printf("Enter the elements of the 2d array \n");
    for (int i = 0; i < n; i++)
    {
        for (int j = 0; j < n; j++)
        {
            scanf("%d",&arr[i][j]);
        }
    }
    for (int i = 0; i < n; i++)
    {
        for (int j = 0; j < n; j++)
        {
            if(arr[i][j]!=0) no_zero++;
        }
    }
    for (int i = 0; i <n; i++)
    {
        for (int j = 0; j <n; j++)
        {
            if(j>i) diagonal_sum+=arr[i][j];
        }
    }
    for (int i = 0,j=0; i < n; i++,j++)
    {
        multiplication*=arr[i][j];
    }
    printf("The elements below the minor diagonal = \n");
    for (int i = 0; i < n; i++)
    {
        for (int j = 0; j < n; j++)
        {
            if(j<i) printf("%d ",arr[i][j]);
            else printf("- ");
        }
        printf("\n");
    }
    printf("Number of non-zero elements = %d\n",no_zero);

    printf("The sum of elements above the diagonal = %d\n ",diagonal_sum);

      printf("The product of diagonal elements = %d\n",multiplication);

}
```

Output:-



```
Enter the elements of the 2d array
1
2
3
4
5
6
7
8
9
The elements below the minor diagonal =
- - -
4 - -
7 8 -
Number of non-zero elements = 9
The sum of elements above the diagonal = 11
 The product of diagonal elements = 45
PS C:\Users\KIIT\Documents\DSA Lab\(Class 2) 2_8_2021> 0
0
```

Q6

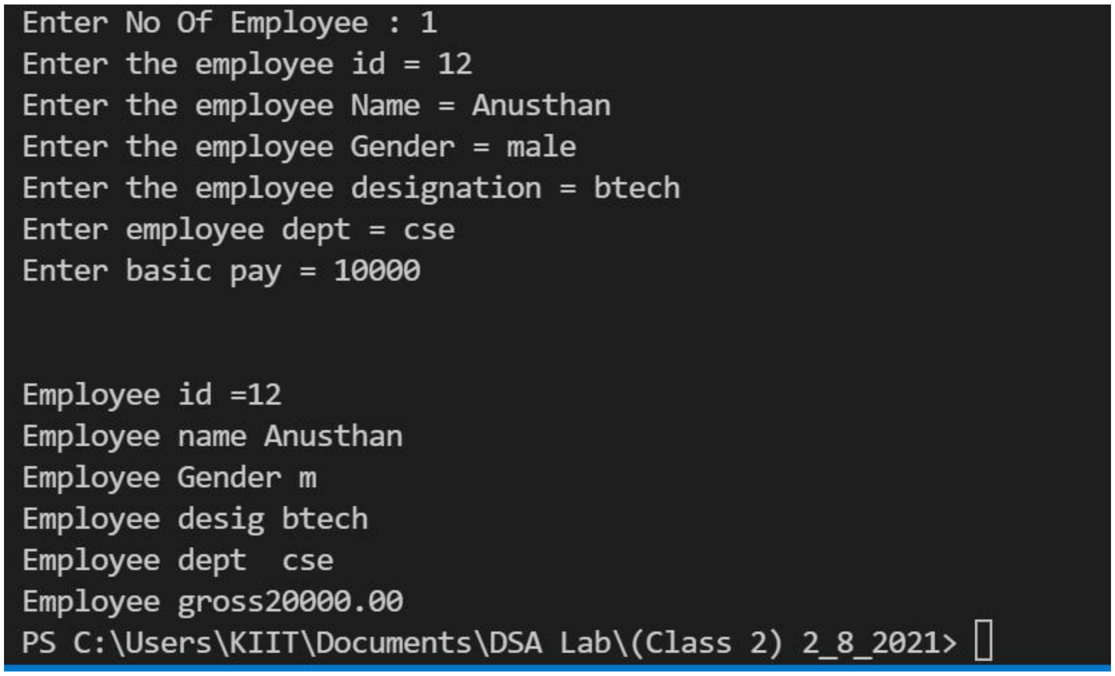


```c
#include <stdio.h>
struct empl
{
    int id,basic;
    char name[100], desig[100], dept[100];
    char gender;
    float gross;

};
int main()
{
    float da, ha;
    struct empl b[10];
    int n;
    printf("Enter No Of Employee : ");
    scanf("%d", &n);

    for (int i = 0; i < n; i++)
    {
        printf("Enter the employee id = ");
        scanf("%d", &b[i].id);
        printf("Enter the employee Name = ");
        scanf(" %[^\n]%*c", b[i].name);
        printf("Enter the employee Gender = ");
        scanf(" %[^\n]%*c", &b[i].gender);
        printf("Enter the employee designation = ");
        scanf(" %[^\n]%*c", b[i].desig);
        printf("Enter employee dept = ");
        scanf(" %[^\n]%*c", b[i].dept);
        printf("Enter basic pay = ");
        scanf("%d", &b[i].basic);
        da = (75 * b[i].basic) / 100.0;
        ha = (25 * b[i].basic) / 100.0;
        b[i].gross = b[i].basic + ha + da ;
        printf("\n");
    }
    int i = 0;


    for (int i = 0; i < n; i++)
    {   printf("\nEmployee id =");
        printf("%d",  b[i].id);
        printf("\nEmployee name ");
        printf("%s",b[i].name);
        printf("\nEmployee Gender ");
        printf("%c",b[i].gender);
        printf("\nEmployee desig ");
         printf("%s",b[i].desig);
         printf("\nEmployee dept  ");
         printf("%s",b[i].dept);
         printf("\nEmployee gross");
         printf("%.2f",b[i].gross);
```

```c
    }
```

```c
    return 0;
}
```

Output:-

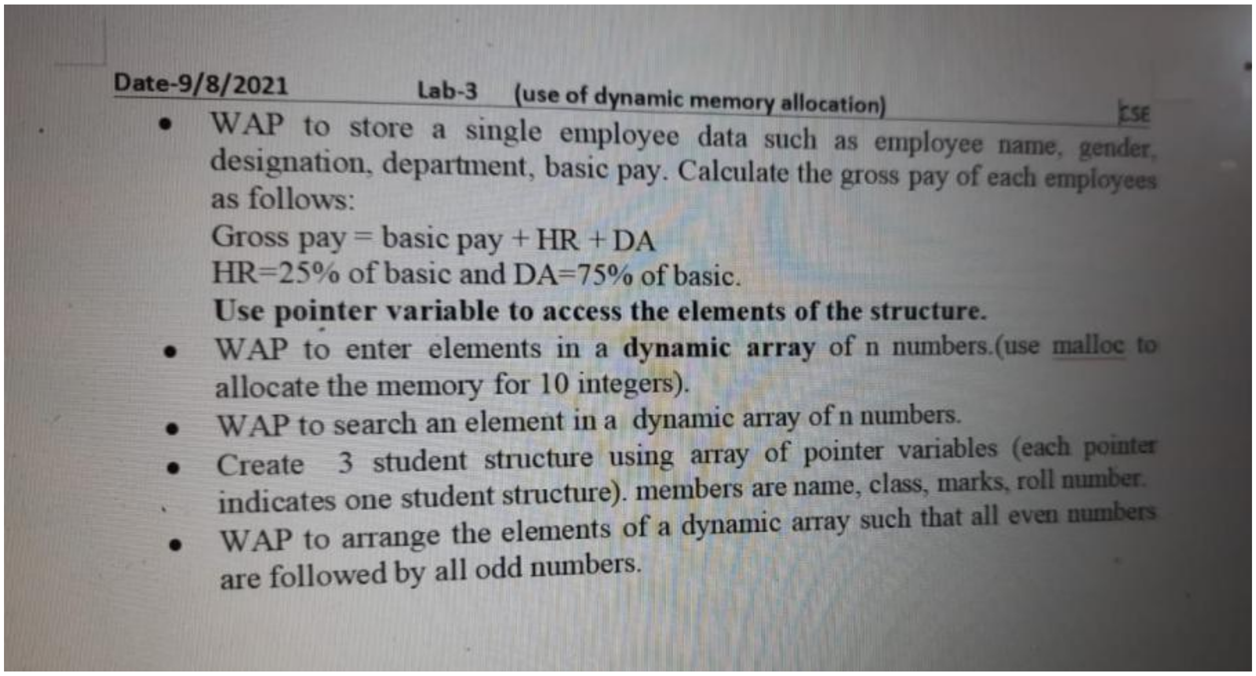


```
Enter No Of Employee : 1
Enter the employee id = 12
Enter the employee Name = Anusthan
Enter the employee Gender = male
Enter the employee designation = btech
Enter employee dept = cse
Enter basic pay = 10000


Employee id =12
Employee name Anusthan
Employee Gender m
Employee desig btech
Employee dept  cse
Employee gross20000.00
PS C:\Users\KIIT\Documents\DSA Lab\(Class 2) 2_8_2021>
```

Lab 3

Date – 9/8/2021

Q



Date-9/8/2021 Lab-3 (use of dynamic memory allocation) CSE

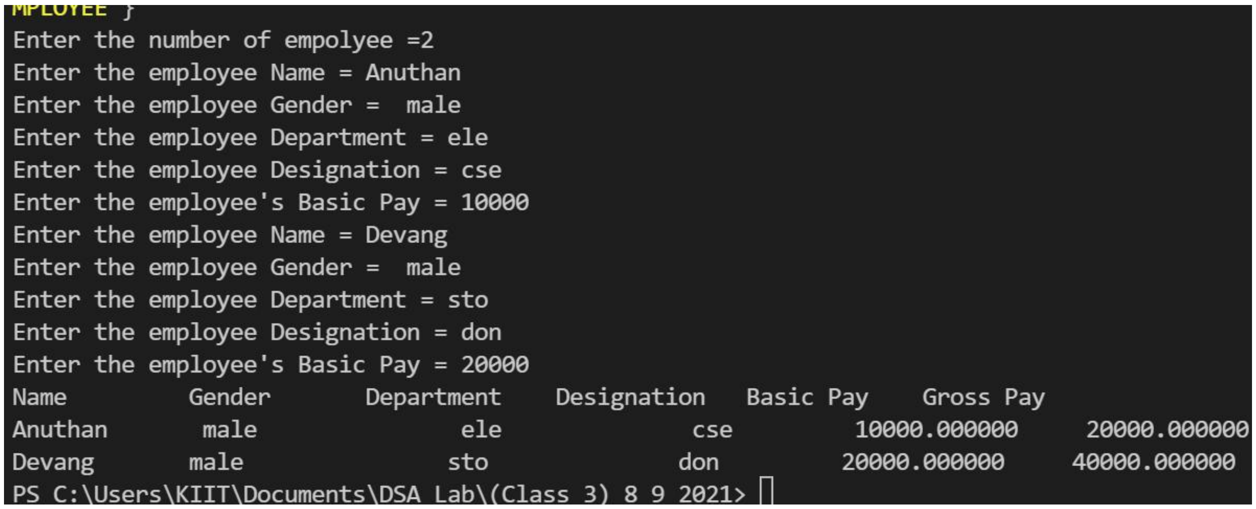
- WAP to store a single employee data such as employee name, gender, designation, department, basic pay. Calculate the gross pay of each employees as follows:
  Gross pay = basic pay + HR + DA
  HR=25% of basic and DA=75% of basic.
  Use pointer variable to access the elements of the structure.
- WAP to enter elements in a **dynamic array** of n numbers.(use malloc to allocate the memory for 10 integers).
- WAP to search an element in a dynamic array of n numbers.
- Create 3 student structure using array of pointer variables (each pointer indicates one student structure). members are name, class, marks, roll number.
- WAP to arrange the elements of a dynamic array such that all even numbers are followed by all odd numbers.

Q1

```c
//By Anusthan Singh (20051337)

#include<stdio.h>
#include<stdlib.h>
int n;

typedef struct
{
char dep[50],name[50],des[50],gen[6];
float basic;

}a;
```

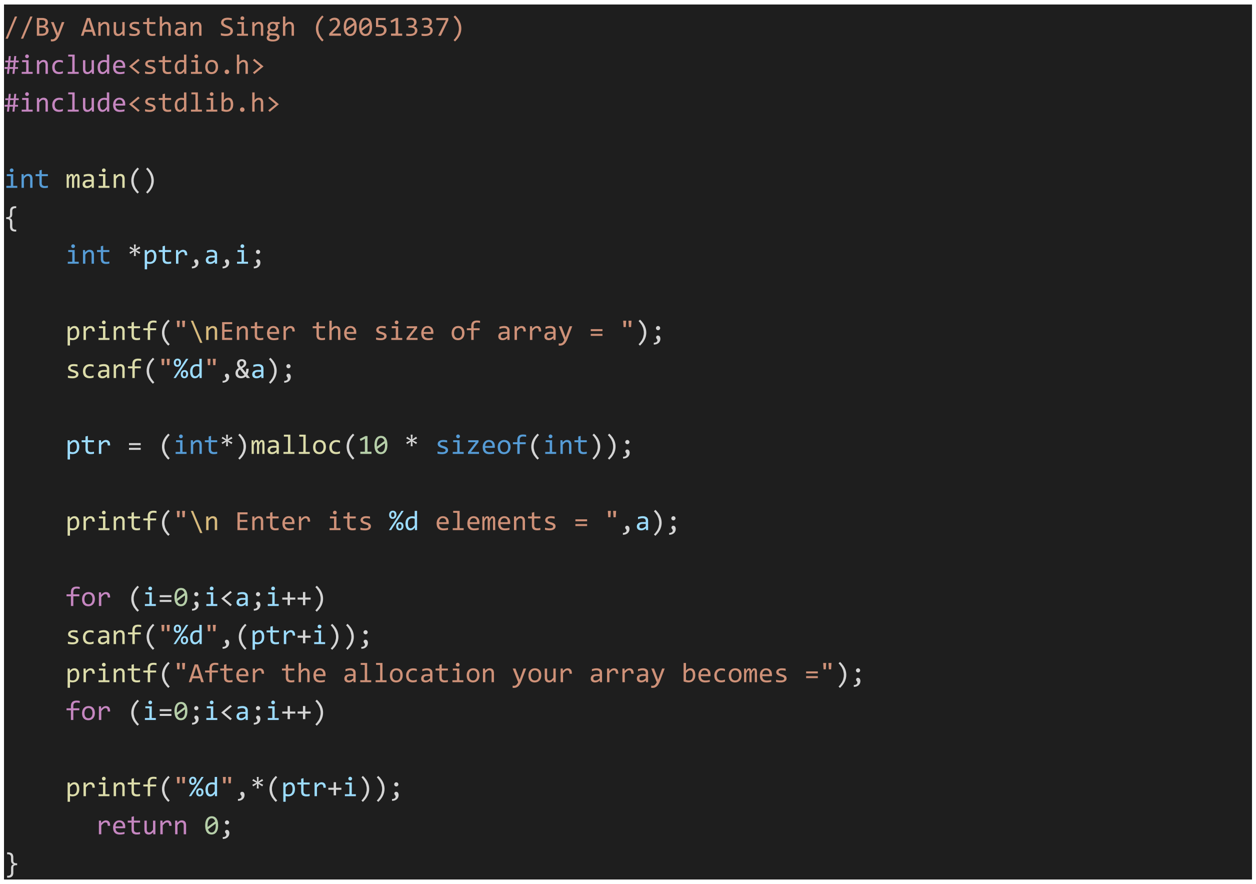
```
int main()
{
    int i;
    float gp,hr,da;
 printf("Enter the number of empolyee =");
scanf("%d",&n);

 a * x= (a*) malloc(n*sizeof(a));

    for(i=0;i<n;i++)
    {
        printf("Enter the employee Name = ");
        scanf("%s",x[i].name);
        printf("Enter the employee Gender =  ");
        scanf("%s",x[i].gen);
        printf("Enter the employee Department = ");
        scanf("%s",&x[i].dep);
        printf("Enter the employee Designation = ");
        scanf("%s",&x[i].des);
        printf("Enter the employee's Basic Pay = ");
        scanf("%f",&x[i].basic);


            }

        printf("Name         Gender       Department    Designation    Basic Pay
  Gross Pay \n");

    for(i=0;i<n;i++)
    {
        hr= (25.0/100.0)*x[i].basic;
        da=(75.0/100.0)*x[i].basic;
        gp= hr+da+x[i].basic;
        printf("%s      %s                %s               %s          %f      %f\n",
x[i].name,x[i].gen,x[i].dep,x[i].des,x[i].basic,gp);
    }

   return 0;
}
```

Output



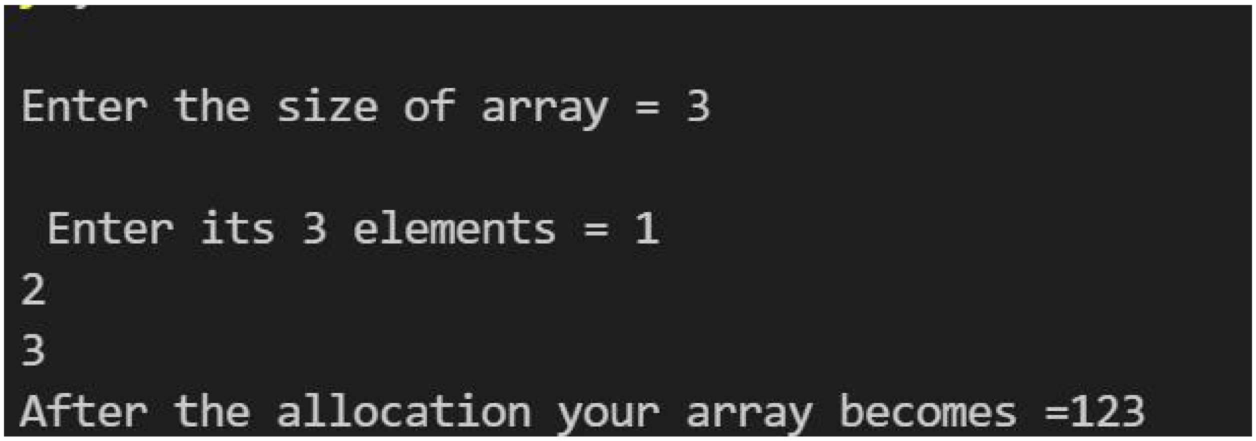
```
MPLOYEE }
Enter the number of empolyee =2
Enter the employee Name = Anuthan
Enter the employee Gender =  male
Enter the employee Department = ele
Enter the employee Designation = cse
Enter the employee's Basic Pay = 10000
Enter the employee Name = Devang
Enter the employee Gender =  male
Enter the employee Department = sto
Enter the employee Designation = don
Enter the employee's Basic Pay = 20000
Name         Gender       Department    Designation   Basic Pay    Gross Pay
Anuthan       male              ele               cse        10000.000000     20000.000000
Devang       male              sto               don        20000.000000     40000.000000
PS C:\Users\KIIT\Documents\DSA Lab\(Class 3) 8 9 2021> 
```

Q2



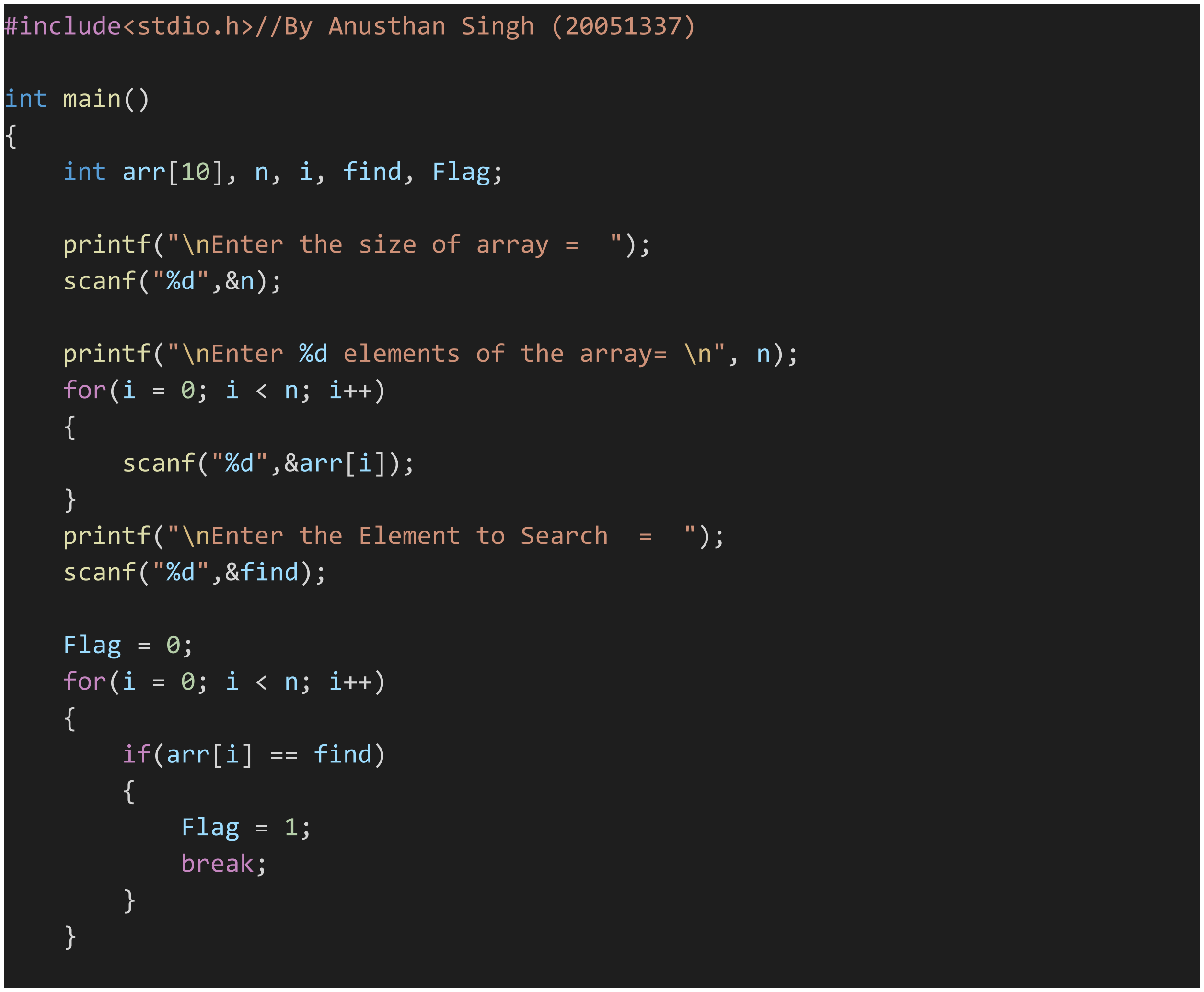
```c
//By Anusthan Singh (20051337)
#include<stdio.h>
#include<stdlib.h>

int main()
{
    int *ptr,a,i;

    printf("\nEnter the size of array = ");
    scanf("%d",&a);

    ptr = (int*)malloc(10 * sizeof(int));

    printf("\n Enter its %d elements = ",a);

    for (i=0;i<a;i++)
    scanf("%d",(ptr+i));
    printf("After the allocation your array becomes =");
    for (i=0;i<a;i++)

    printf("%d",*(ptr+i));
      return 0;
}
```

Output



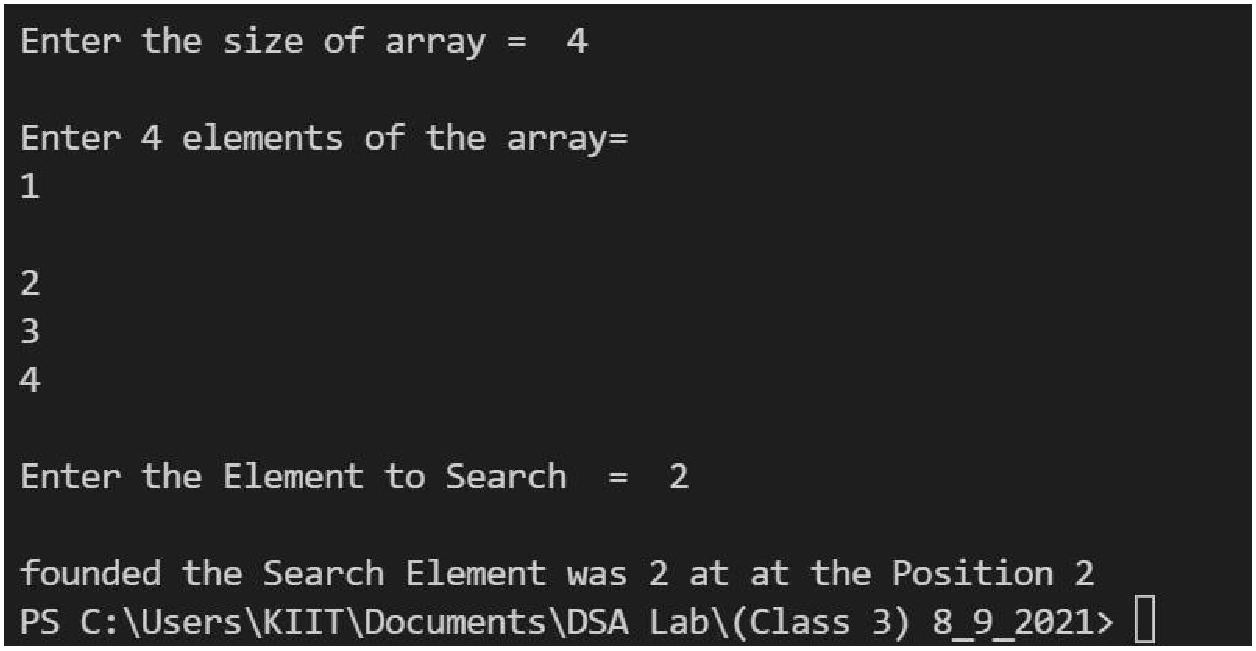
```
Enter the size of array = 3

 Enter its 3 elements = 1
2
3
After the allocation your array becomes =123
```

Q3.



```
#include<stdio.h>//By Anusthan Singh (20051337)

int main()
{
    int arr[10], n, i, find, Flag;

    printf("\nEnter the size of array =  ");
    scanf("%d",&n);

    printf("\nEnter %d elements of the array= \n", n);
    for(i = 0; i < n; i++)
    {
        scanf("%d",&arr[i]);
    }
    printf("\nEnter the Element to Search  =  ");
    scanf("%d",&find);

    Flag = 0;
    for(i = 0; i < n; i++)
    {
        if(arr[i] == find)
        {
            Flag = 1;
            break;
        }
    }
    if(Flag == 1)
    {
        printf("\nfounded the Search Element was %d at at the Position %d ", find,
 i + 1);
    }
    else
    {
        printf("\n Not found the the Search Element %d ", find);
    }
    return 0;
}
```

Output



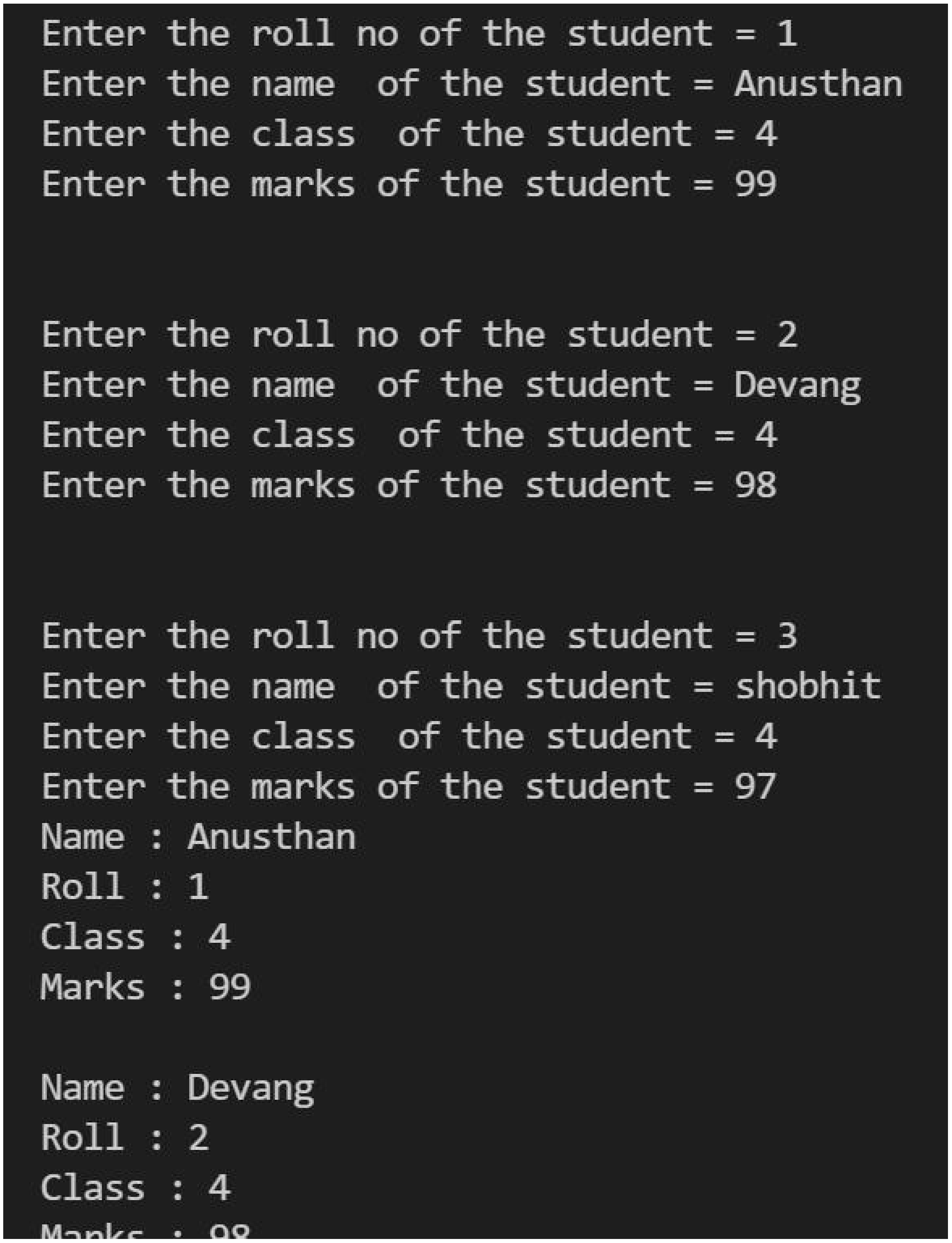
```
Enter the size of array =  4

Enter 4 elements of the array=
1

2
3
4

Enter the Element to Search  =  2

founded the Search Element was 2 at at the Position 2
PS C:\Users\KIIT\Documents\DSA Lab\(Class 3) 8_9_2021> 
```

Q4.

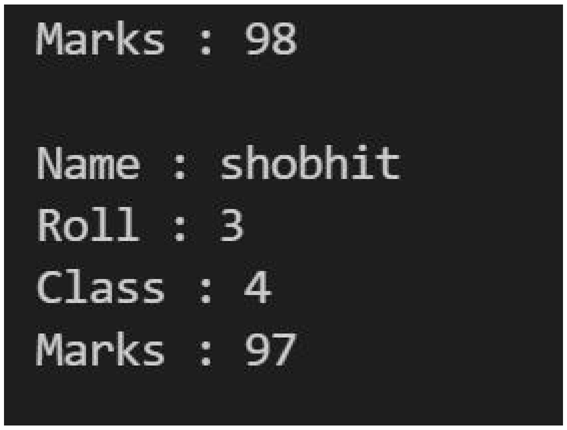
```
#include <stdlib.h>
#include <stdio.h>
struct student
{
 int roll, class, mark;
 char name[50];
};
```

```c
int main(void)
{
 struct student s[3], *ptr;
 for (int i = 0; i < 3; i++)
 {
printf("\n\nEnter the roll no of the student = ");

 scanf("%d", &s[i].roll);
 printf("Enter the name  of the student = ");
 scanf("%s", &s[i].name);
 printf("Enter the class  of the student = ");
 scanf("%d", &s[i].class);
 printf("Enter the marks of the student = ");
 scanf("%d", &s[i].mark);
 }
 ptr = s;
 for (int i = 0; i < 3; i++)
 {
 printf("Name : %s\n", ptr->name);
 printf("Roll : %d\n", ptr->roll);
 printf("Class : %d\n", ptr->class);
 printf("Marks : %d\n\n", ptr->mark);
 ptr++;
 } }
```

Output:-

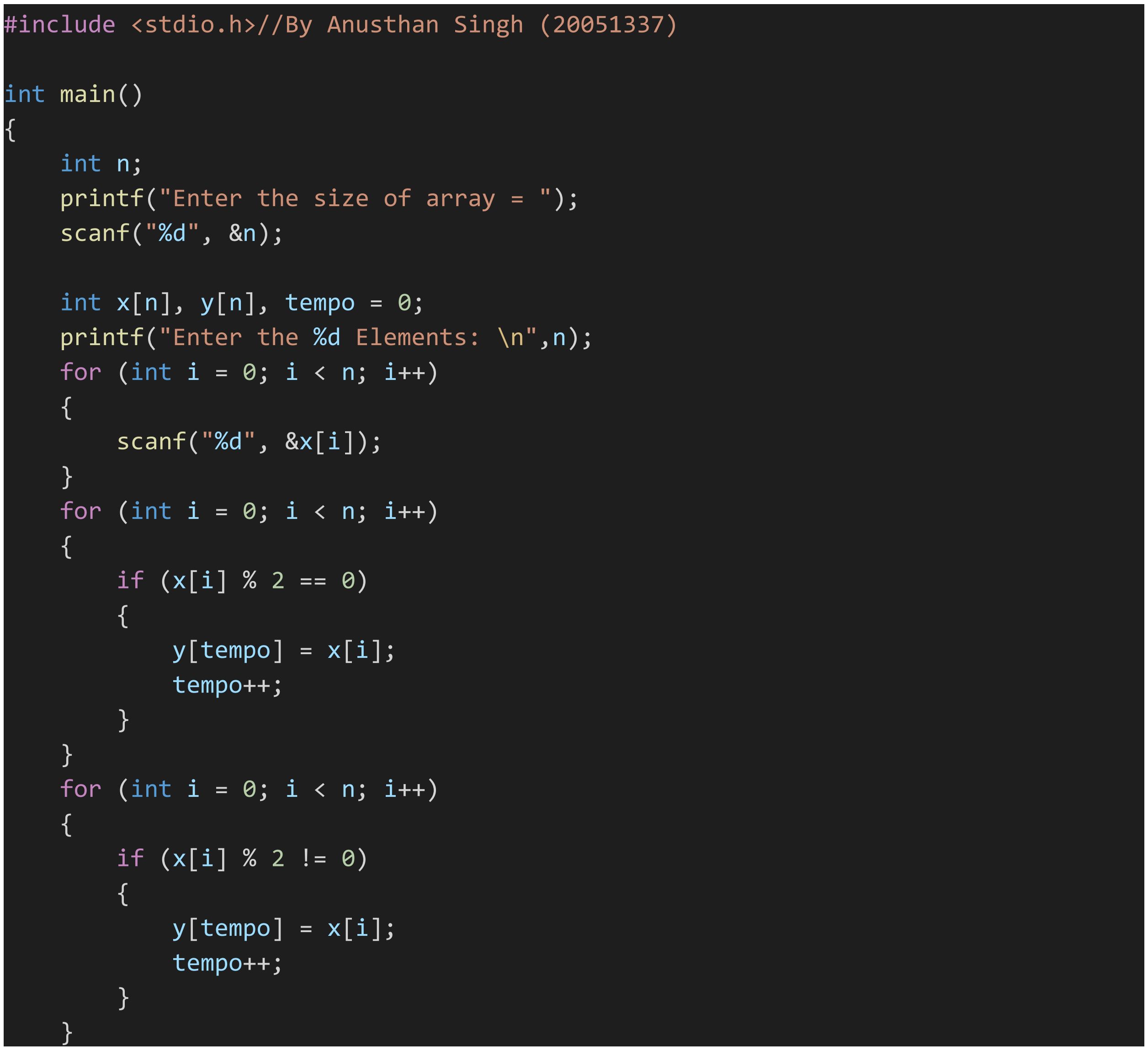


```
Enter the roll no of the student = 1
Enter the name  of the student = Anusthan
Enter the class  of the student = 4
Enter the marks of the student = 99


Enter the roll no of the student = 2
Enter the name  of the student = Devang
Enter the class  of the student = 4
Enter the marks of the student = 98


Enter the roll no of the student = 3
Enter the name  of the student = shobhit
Enter the class  of the student = 4
Enter the marks of the student = 97
Name : Anusthan
Roll : 1
Class : 4
Marks : 99

Name : Devang
Roll : 2
Class : 4
Marks : 98
```



```
Marks : 98

Name : shobhit
Roll : 3
Class : 4
Marks : 97
```

Q5.



```c
#include <stdio.h>//By Anusthan Singh (20051337)

int main()
{
    int n;
    printf("Enter the size of array = ");
    scanf("%d", &n);

    int x[n], y[n], tempo = 0;
    printf("Enter the %d Elements: \n",n);
    for (int i = 0; i < n; i++)
    {
        scanf("%d", &x[i]);
    }
    for (int i = 0; i < n; i++)
    {
        if (x[i] % 2 == 0)
        {
            y[tempo] = x[i];
            tempo++;
        }
    }
    for (int i = 0; i < n; i++)
    {
        if (x[i] % 2 != 0)
        {
            y[tempo] = x[i];
            tempo++;
        }
    }
    printf("Your new array as even odd allocation = \n");
    for (int i = 0; i < n; i++)
    {
        printf("%d ", y[i]);
    }
    return 0;
}
```

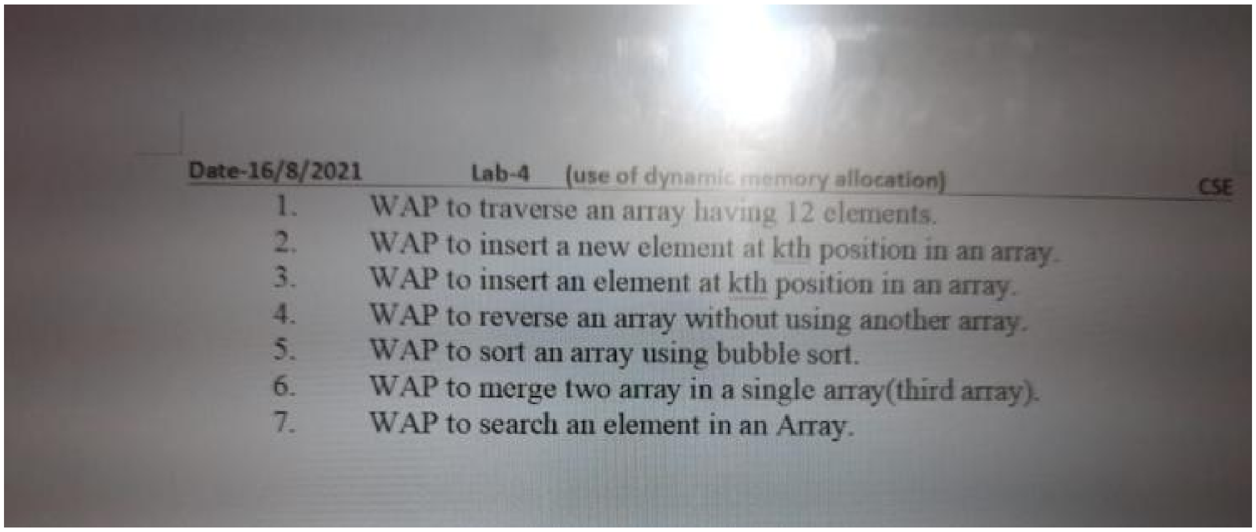
Output:-

```
Enter the size of array = 4
Enter the 4 Elements:
1
2
3
4
Your new array as even odd allocation =
2 4 1 3
PS C:\Users\KIIT\Documents\DSA Lab\(Class 3) 8_9_2021> cd "c:\Users\KIIT\Documents\DSA Lab\(Class 3
) 8_9_2021\" ; if ($?) { gcc Q5_even_odd_followed.c -o Q5_even_odd_followed } ; if ($?) { .\Q5_even
_odd_followed }
```

Lab 4

Date - 16/8/2021

Q



Date-16/8/2021 Lab-4 (use of dynamic memory allocation) CSE

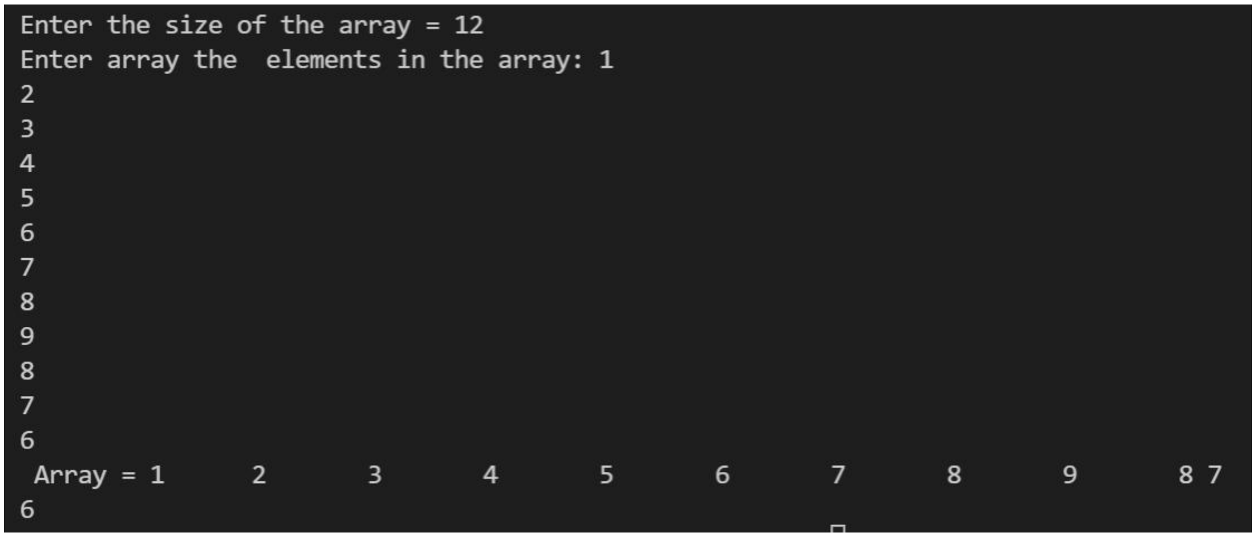
1. WAP to traverse an array having 12 elements.
2. WAP to insert a new element at kth position in an array.
3. WAP to insert an element at kth position in an array.
4. WAP to reverse an array without using another array.
5. WAP to sort an array using bubble sort.
6. WAP to merge two array in a single array(third array).
7. WAP to search an element in an Array.

Q1

```
#include<stdio.h>//By Anusthan Singh (20051337)
#include<conio.h>
```

```c
int main()
{
    int num1;
    printf("Enter the size of the array = ");
    scanf("%d",&num1);
    int arr[num1],i;
    printf("Enter array the  elements in the array: ");
    for(i=0;i<num1;i++)
    scanf("%d",&arr[i]);
    printf(" Array = ");
    for(i=0;i<num1;i++)
    printf("%d\t",arr[i]);
    return 0;
    getch();
}
```

Output:-

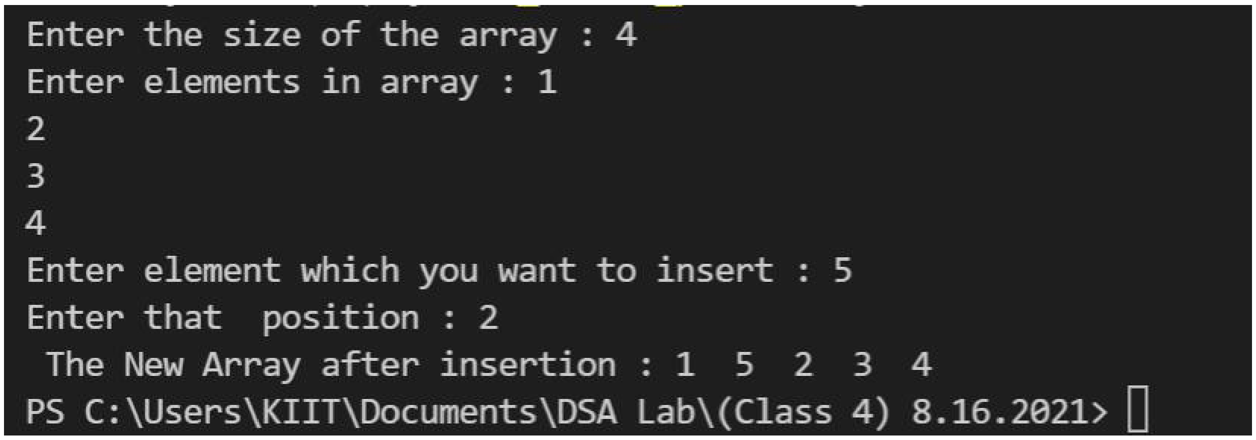

```
Enter the size of the array = 12
Enter array the  elements in the array: 1
2
3
4
5
6
7
8
9
8
7
6
 Array = 1       2       3       4       5       6       7       8       9       8 7
6
```

Q2.

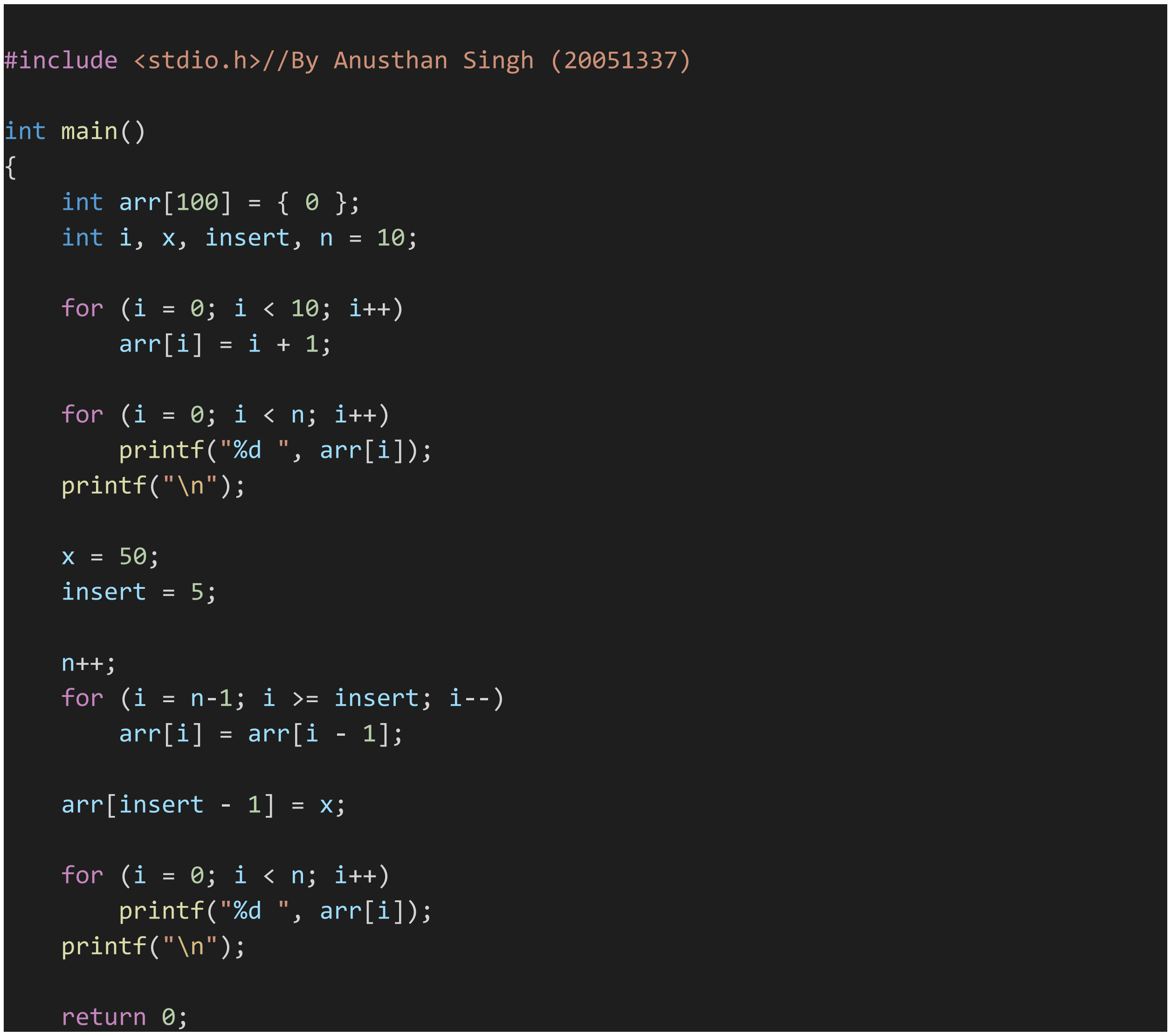
```c
#include <stdio.h>//By Anusthan Singh (20051337)
#define MAX_SIZE 100

int main()
```

```c
{
    int arr[MAX_SIZE];
    int i, size, element, position;
    printf("Enter the size of the array : ");
    scanf("%d", &size);
    printf("Enter elements in array : ");
    for(i=0; i<size; i++)
    {
        scanf("%d", &arr[i]);
    }
    printf("Enter element which you want to insert : ");
    scanf("%d", &element);
    printf("Enter that  position : ");
    scanf("%d", &position);

    if(position > size+1 || position <= 0)
    {
        printf(" Not possible! Please enter position between 1 to %d", size);
    }
    else
    {
        for(i=size; i>=position; i--) // // New room by right shift kar ke
        {
            arr[i] = arr[i-1];
        }
        arr[position-1] = element;    //Insertation
        size++;

        printf(" The New Array after insertion : ");
        for(i=0; i<size; i++)
        {
            printf("%d  ", arr[i]);
        }
    }

    return 0;
}
```

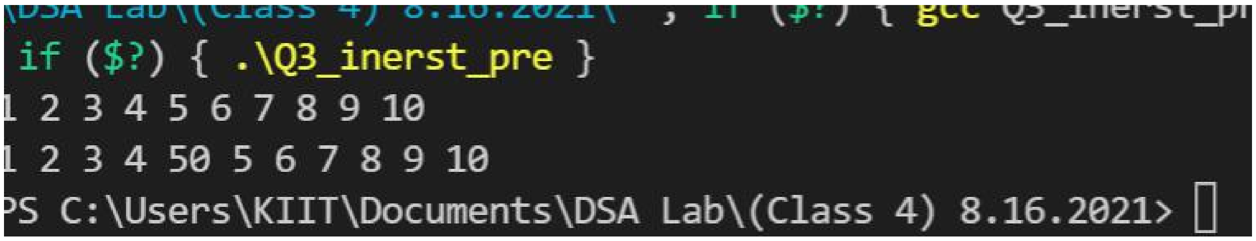
Output:-


```
Enter the size of the array : 4
Enter elements in array : 1
2
3
4
Enter element which you want to insert : 5
Enter that  position : 2
 The New Array after insertion : 1  5  2  3  4
PS C:\Users\KIIT\Documents\DSA Lab\(Class 4) 8.16.2021>
```

Q3.


```c
#include <stdio.h>//By Anusthan Singh (20051337)

int main()
{
    int arr[100] = { 0 };
    int i, x, insert, n = 10;

    for (i = 0; i < 10; i++)
        arr[i] = i + 1;

    for (i = 0; i < n; i++)
        printf("%d ", arr[i]);
    printf("\n");

    x = 50;
    insert = 5;

    n++;
    for (i = n-1; i >= insert; i--)
        arr[i] = arr[i - 1];

    arr[insert - 1] = x;

    for (i = 0; i < n; i++)
        printf("%d ", arr[i]);
    printf("\n");

    return 0;
}
```

Output.

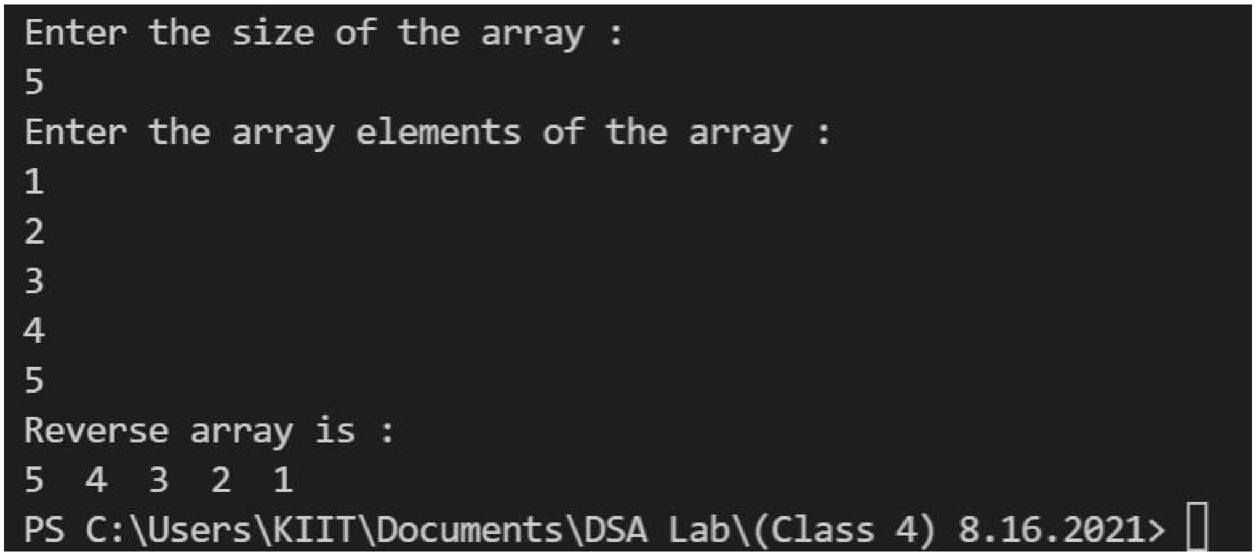


```
\DSA Lab\(Class 4) 8.16.2021\" ; if ($?) { gcc Q3_inerst_pr
 if ($?) { .\Q3_inerst_pre }
1 2 3 4 5 6 7 8 9 10
1 2 3 4 50 5 6 7 8 9 10
PS C:\Users\KIIT\Documents\DSA Lab\(Class 4) 8.16.2021>
```

Q4.

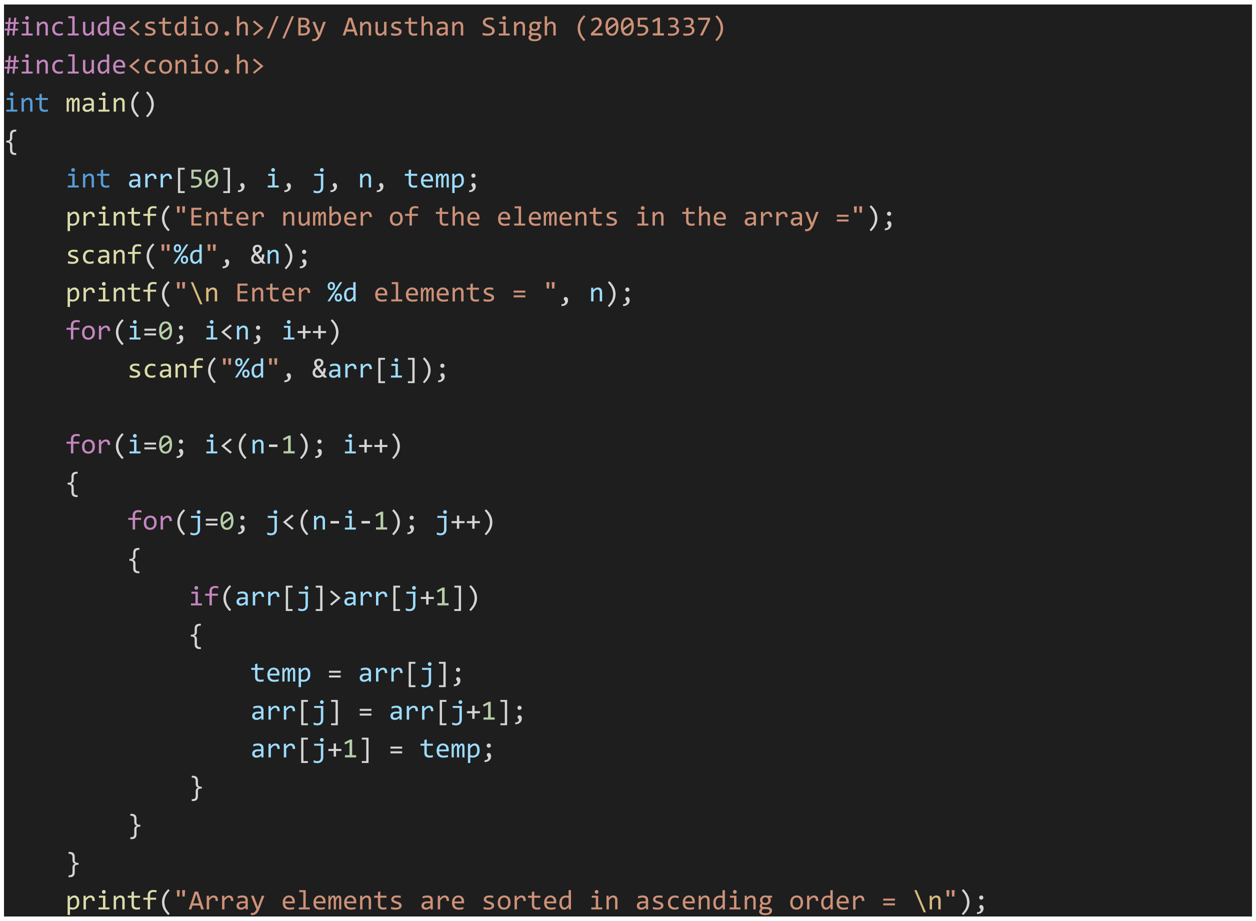
```
#include <stdio.h>//By Anusthan Singh (20051337)
int main()
{
    int n, i, d, a[100], b[100];
    printf("Enter the size of the array : \n");
    scanf("%d", &n);
    printf("Enter the array elements of the array : \n");
    for (i = 0; i < n; i++){
        scanf("%d", &a[i]);
    }
    for (i = n - 1, d = 0; i >= 0; i--, d++)
        b[d] = a[i];
    for (i = 0; i < n; i++)
        a[i] = b[i];
    printf("Reverse array is : \n");
    for (i = 0; i < n; i++)
        printf("%d  ", a[i]);
    return 0;
}
```

Output.

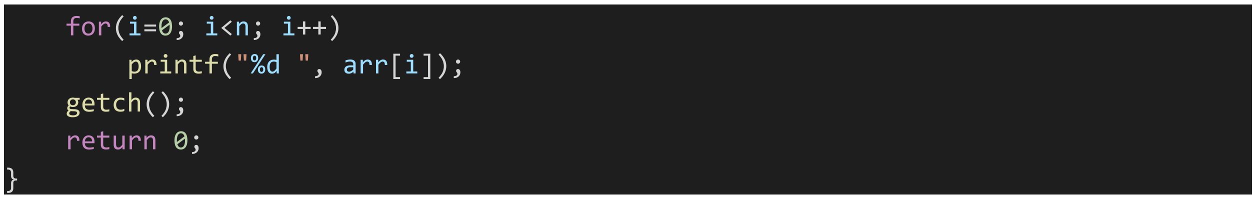


```
Enter the size of the array :
5
Enter the array elements of the array :
1
2
3
4
5
Reverse array is :
5  4  3  2  1
PS C:\Users\KIIT\Documents\DSA Lab\(Class 4) 8.16.2021> 
```

Q5.

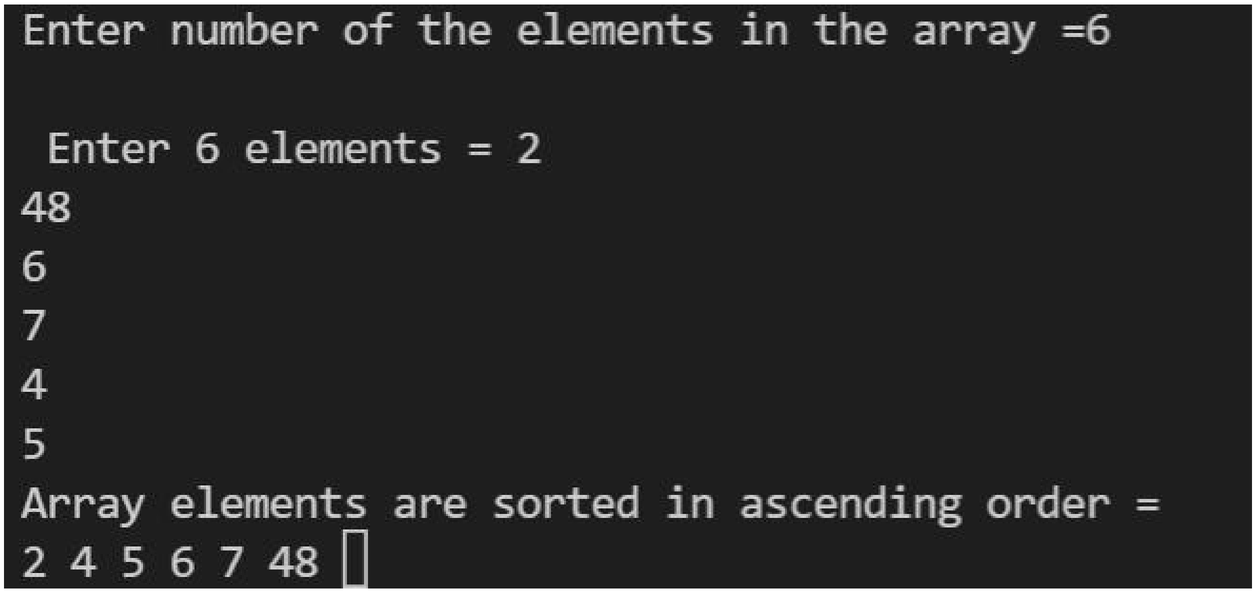


```
#include<stdio.h>//By Anusthan Singh (20051337)
#include<conio.h>
int main()
{
    int arr[50], i, j, n, temp;
    printf("Enter number of the elements in the array =");
    scanf("%d", &n);
    printf("\n Enter %d elements = ", n);
    for(i=0; i<n; i++)
        scanf("%d", &arr[i]);

    for(i=0; i<(n-1); i++)
    {
        for(j=0; j<(n-i-1); j++)
        {
            if(arr[j]>arr[j+1])
            {
                temp = arr[j];
                arr[j] = arr[j+1];
                arr[j+1] = temp;
            }
        }
    }
    printf("Array elements are sorted in ascending order = \n");
```



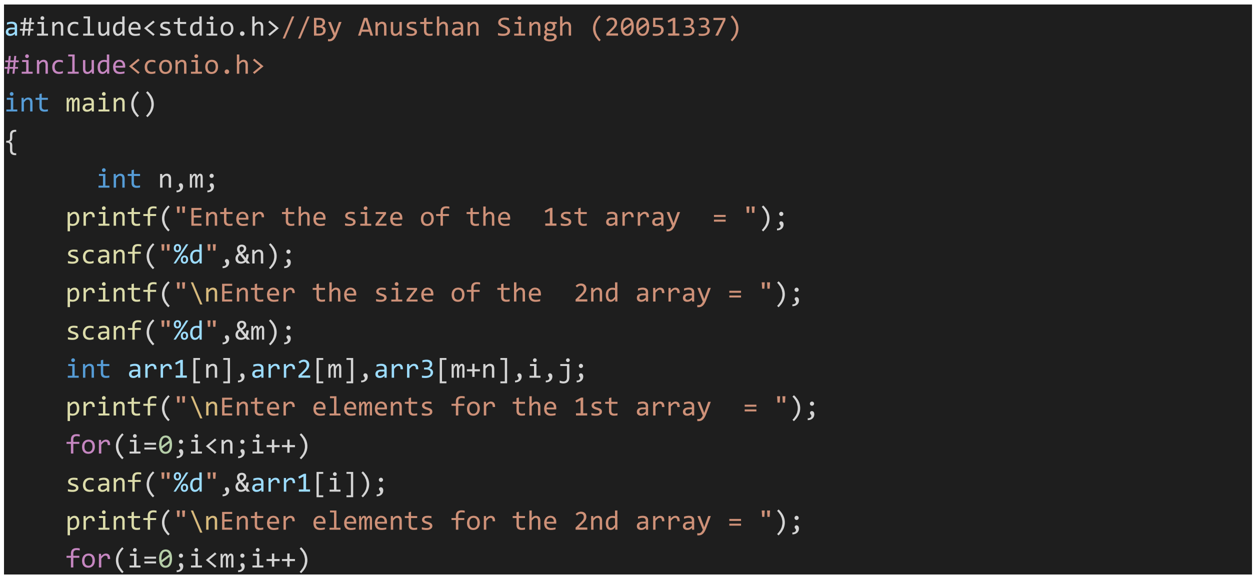
```
    for(i=0; i<n; i++)
        printf("%d ", arr[i]);
    getch();
    return 0;
}
```

Output.

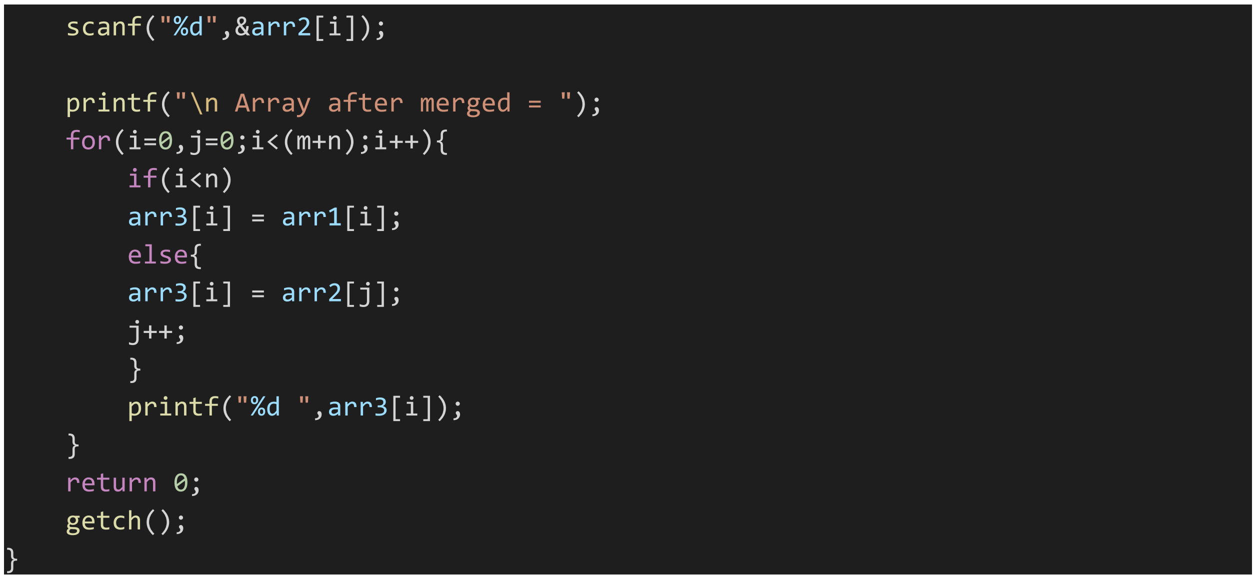


```
Enter number of the elements in the array =6

 Enter 6 elements = 2
48
6
7
4
5
Array elements are sorted in ascending order =
2 4 5 6 7 48
```

Q6.

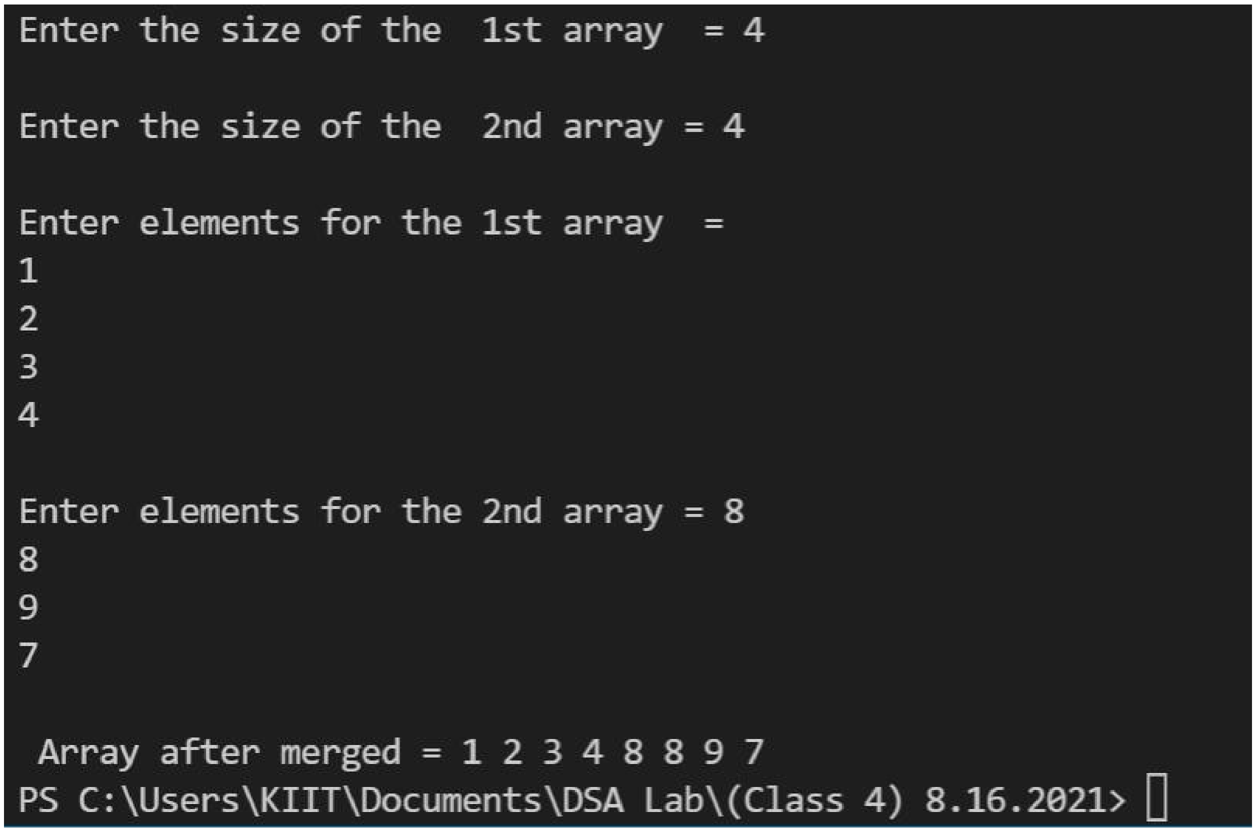


```
a#include<stdio.h>//By Anusthan Singh (20051337)
#include<conio.h>
int main()
{
      int n,m;
    printf("Enter the size of the  1st array  = ");
    scanf("%d",&n);
    printf("\nEnter the size of the  2nd array = ");
    scanf("%d",&m);
    int arr1[n],arr2[m],arr3[m+n],i,j;
    printf("\nEnter elements for the 1st array  = ");
    for(i=0;i<n;i++)
    scanf("%d",&arr1[i]);
    printf("\nEnter elements for the 2nd array = ");
    for(i=0;i<m;i++)
```



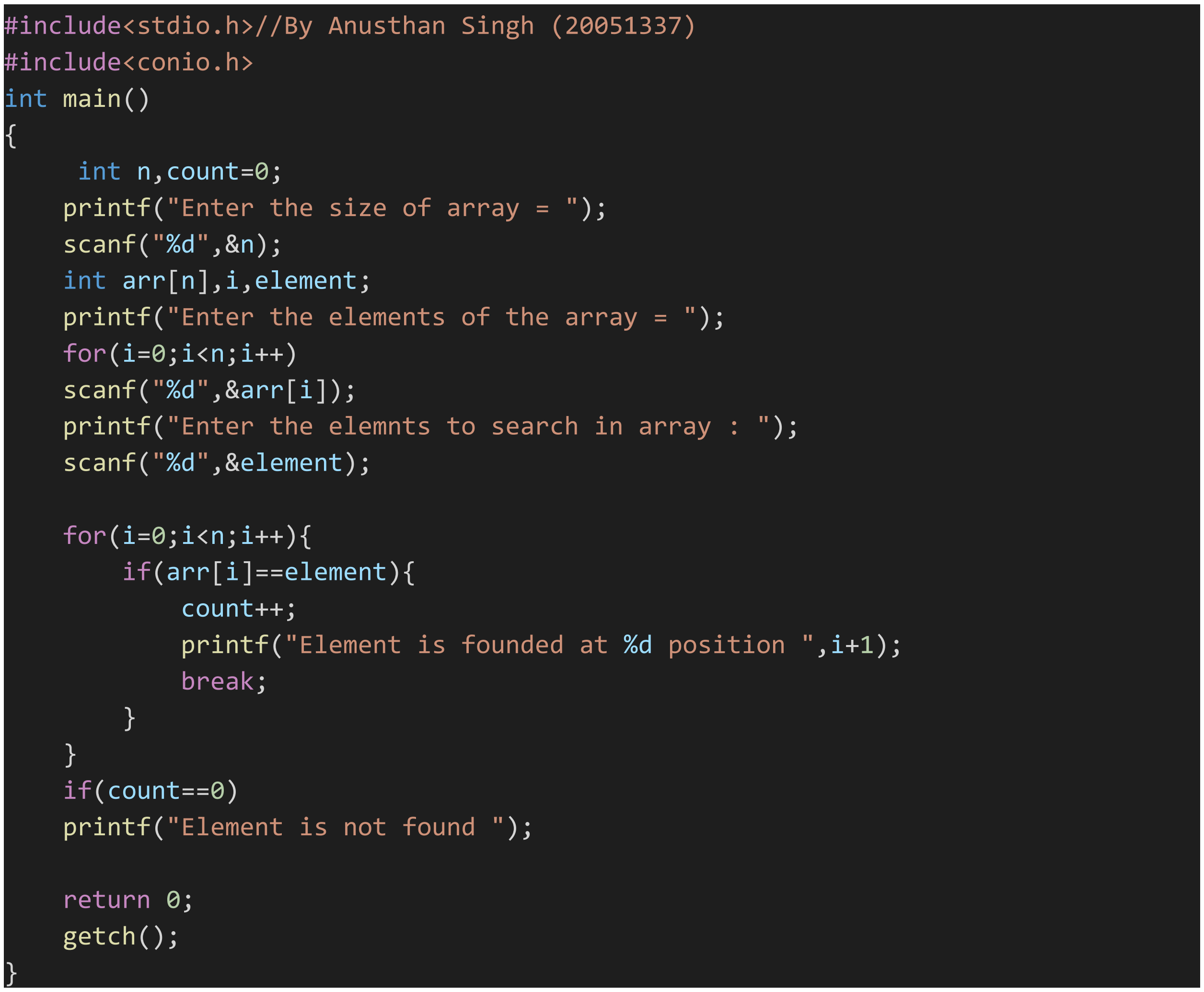
```c
    scanf("%d",&arr2[i]);

    printf("\n Array after merged = ");
    for(i=0,j=0;i<(m+n);i++){
        if(i<n)
        arr3[i] = arr1[i];
        else{
        arr3[i] = arr2[j];
        j++;
        }
        printf("%d ",arr3[i]);
    }
    return 0;
    getch();
}
```

Output.



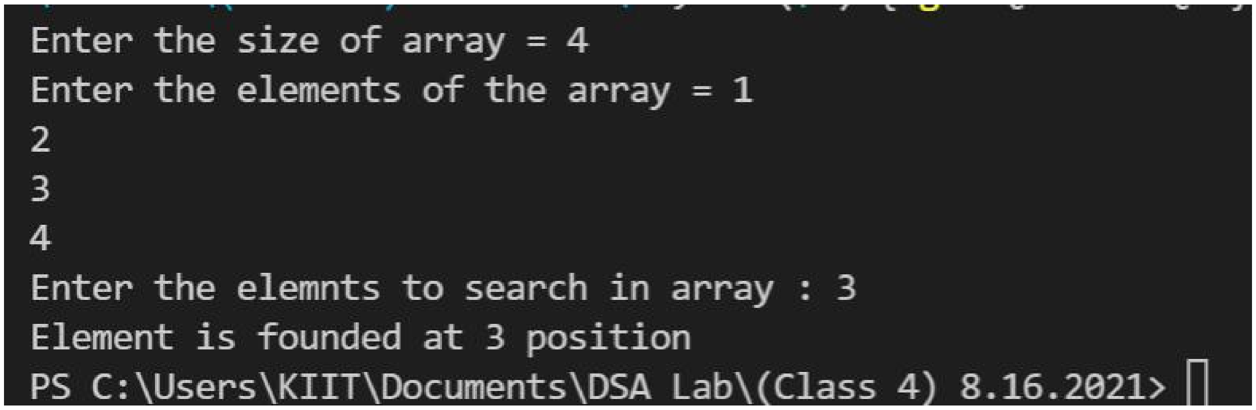
```
Enter the size of the  1st array  = 4

Enter the size of the  2nd array = 4

Enter elements for the 1st array  =
1
2
3
4

Enter elements for the 2nd array = 8
8
9
7

 Array after merged = 1 2 3 4 8 8 9 7
PS C:\Users\KIIT\Documents\DSA Lab\(Class 4) 8.16.2021>
```

Q7.



```c
#include<stdio.h>//By Anusthan Singh (20051337)
#include<conio.h>
int main()
{
     int n,count=0;
    printf("Enter the size of array = ");
    scanf("%d",&n);
    int arr[n],i,element;
    printf("Enter the elements of the array = ");
    for(i=0;i<n;i++)
    scanf("%d",&arr[i]);
    printf("Enter the elemnts to search in array : ");
    scanf("%d",&element);

    for(i=0;i<n;i++){
        if(arr[i]==element){
            count++;
            printf("Element is founded at %d position ",i+1);
            break;
        }
    }
    if(count==0)
    printf("Element is not found ");

    return 0;
    getch();
}
```

Output.

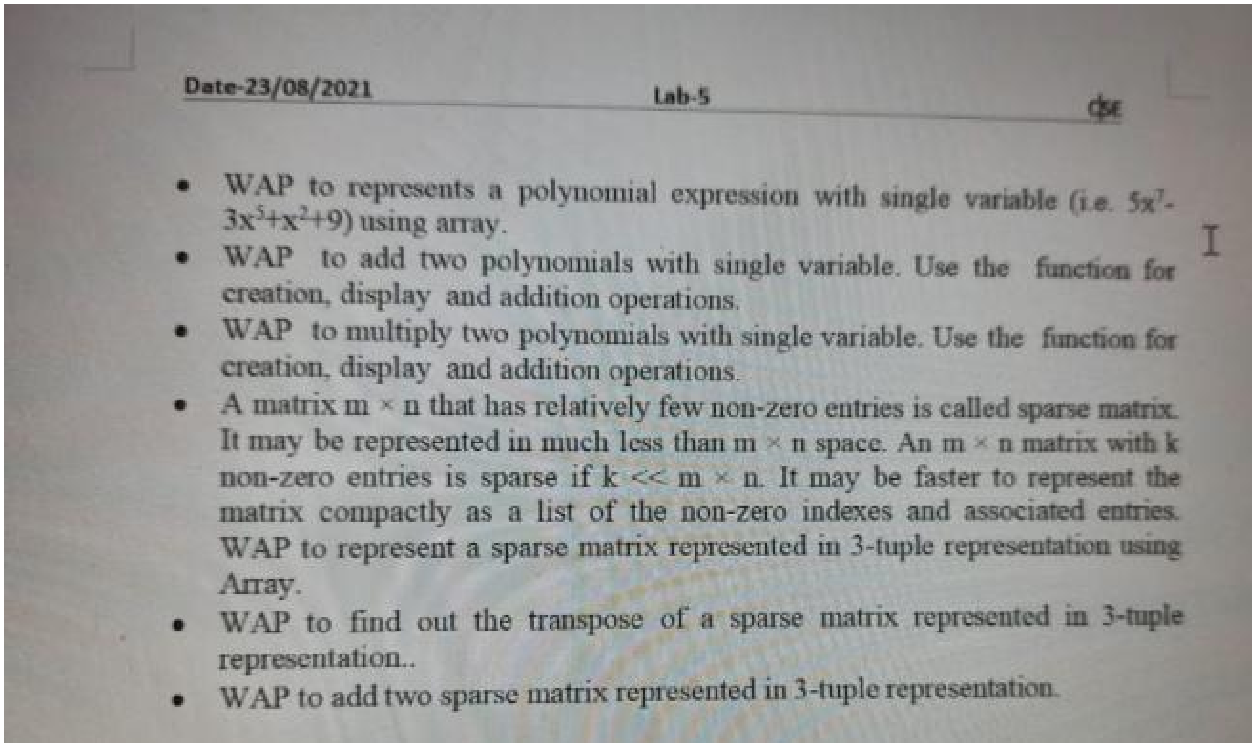


```
Enter the size of array = 4
Enter the elements of the array = 1
2
3
4
Enter the elemnts to search in array : 3
Element is founded at 3 position
PS C:\Users\KIIT\Documents\DSA Lab\(Class 4) 8.16.2021>
```

Lab – 5

Date – 23/8/2021

Q



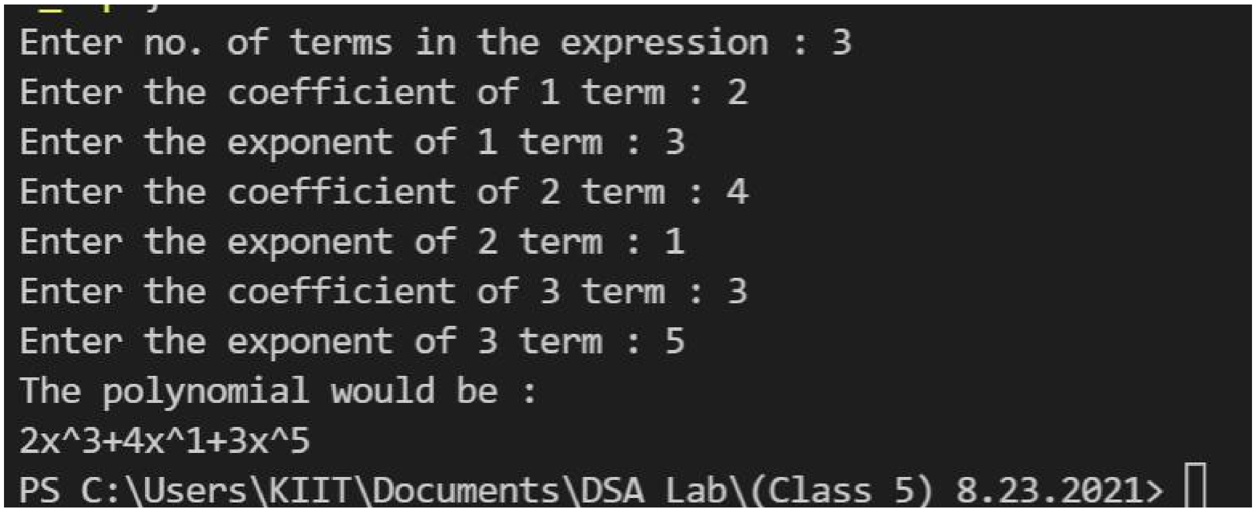
Date-23/08/2021 Lab-5 CSE

- WAP to represents a polynomial expression with single variable (i.e. $5x^7-3x^5+x^2+9$) using array.
- WAP to add two polynomials with single variable. Use the function for creation, display and addition operations.
- WAP to multiply two polynomials with single variable. Use the function for creation, display and addition operations.
- A matrix m × n that has relatively few non-zero entries is called sparse matrix. It may be represented in much less than m × n space. An m × n matrix with k non-zero entries is sparse if k << m × n. It may be faster to represent the matrix compactly as a list of the non-zero indexes and associated entries. WAP to represent a sparse matrix represented in 3-tuple representation using Array.
- WAP to find out the transpose of a sparse matrix represented in 3-tuple representation..
- WAP to add two sparse matrix represented in 3-tuple representation.

Q1.

```c
#include<stdio.h>//By Anusthan Singh (20051337)
#include<conio.h>
int main()
{
    int x;
    printf("Enter no. of terms in the expression : ");
    scanf("%d",&x);
    int coe[x],exp[x];
    for(int i=0;i<x;i++){
        printf("Enter the coefficient of %d term : ",i+1);
        scanf("%d",&coe[i]);
        printf("Enter the exponent of %d term : ",i+1);
        scanf("%d",&exp[i]);
    }
    printf("The polynomial would be : \n");
    for(int i=0;i<x-1;i++){
        printf("%dx^%d+",coe[i],exp[i]);
    }
    printf("%dx^%d",coe[x-1],exp[x-1]);
    return 0;
    getch();
}
```

Output .



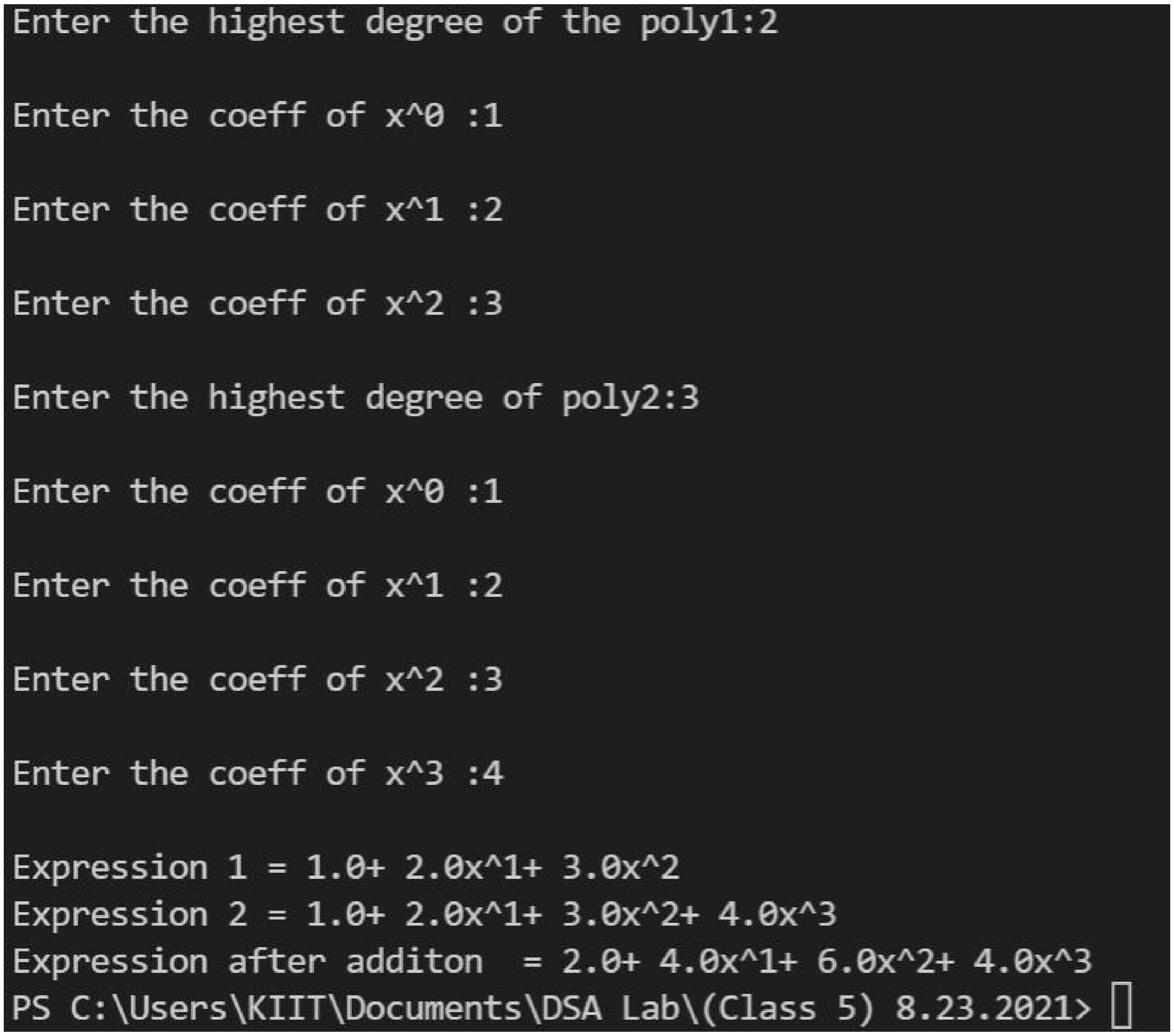
```
Enter no. of terms in the expression : 3
Enter the coefficient of 1 term : 2
Enter the exponent of 1 term : 3
Enter the coefficient of 2 term : 4
Enter the exponent of 2 term : 1
Enter the coefficient of 3 term : 3
Enter the exponent of 3 term : 5
The polynomial would be :
2x^3+4x^1+3x^5
PS C:\Users\KIIT\Documents\DSA Lab\(Class 5) 8.23.2021>
```

Q2.

```c
#include<stdio.h>//By Anusthan Singh (20051337)
#include<math.h>
struct poly
{
  float coeff;
  int exp;
};
struct poly a[20],b[20],c[20],d[20];
int main()
{
 int i;
 int deg1,deg2;
 int k=0,l=0,m=0;

 printf("Enter the highest degree of the poly1:");
```

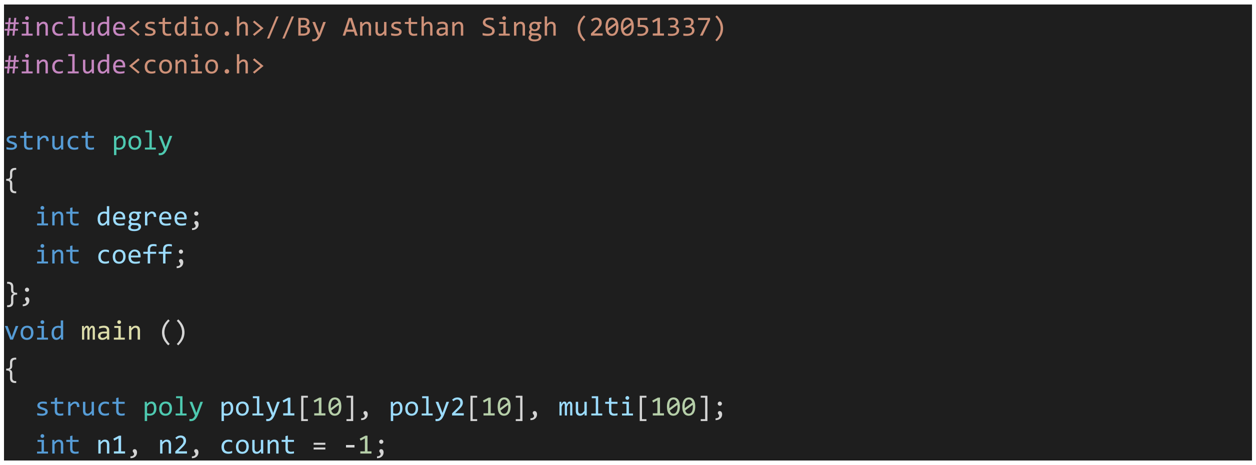
```
scanf("%d",&deg1);

for(i=0;i<=deg1;i++)
{
   printf("\nEnter the coeff of x^%d :",i);
   scanf("%f",&a[i].coeff);
 a[k++].exp = i;
}
printf("\nEnter the highest degree of poly2:");
scanf("%d",&deg2);

for(i=0;i<=deg2;i++)
{
      printf("\nEnter the coeff of x^%d :",i);
      scanf("%f",&b[i].coeff);

    b[l++].exp = i;
}
 printf("\nExpression 1 = %.1f",a[0].coeff);
 for(i=1;i<=deg1;i++)
 {
   printf("+ %.1fx^%d",a[i].coeff,a[i].exp);
 }
 printf("\nExpression 2 = %.1f",b[0].coeff);
  for(i=1;i<=deg2;i++)
   {
     printf("+ %.1fx^%d",b[i].coeff,b[i].exp);
   }
if(deg1>deg2)
   {
    for(i=0;i<=deg2;i++)
     {
     c[m].coeff = a[i].coeff + b[i].coeff;
     c[m].exp = a[i].exp;
     m++;
     }

     for(i=deg2+1;i<=deg1;i++)
     {
     c[m].coeff = a[i].coeff;
     c[m].exp = a[i].exp;
     m++;
     }

   }
 else
  {
    for(i=0;i<=deg1;i++)
     {
       c[m].coeff = a[i].coeff + b[i].coeff;
       c[m].exp = a[i].exp;
       m++;
     }

  for(i=deg1+1;i<=deg2;i++)
    {
      c[m].coeff = b[i].coeff;
      c[m].exp = b[i].exp;
      m++;
    }
  }
  printf("\nExpression after additon  = %.1f",c[0].coeff);
  for(i=1;i<m;i++)
  {
     printf("+ %.1fx^%d",c[i].coeff,c[i].exp);
   }

  return 0;

}
```

Output.



```
Enter the highest degree of the poly1:2

Enter the coeff of x^0 :1

Enter the coeff of x^1 :2

Enter the coeff of x^2 :3

Enter the highest degree of poly2:3

Enter the coeff of x^0 :1

Enter the coeff of x^1 :2

Enter the coeff of x^2 :3

Enter the coeff of x^3 :4

Expression 1 = 1.0+ 2.0x^1+ 3.0x^2
Expression 2 = 1.0+ 2.0x^1+ 3.0x^2+ 4.0x^3
Expression after additon  = 2.0+ 4.0x^1+ 6.0x^2+ 4.0x^3
PS C:\Users\KIIT\Documents\DSA Lab\(Class 5) 8.23.2021>
```

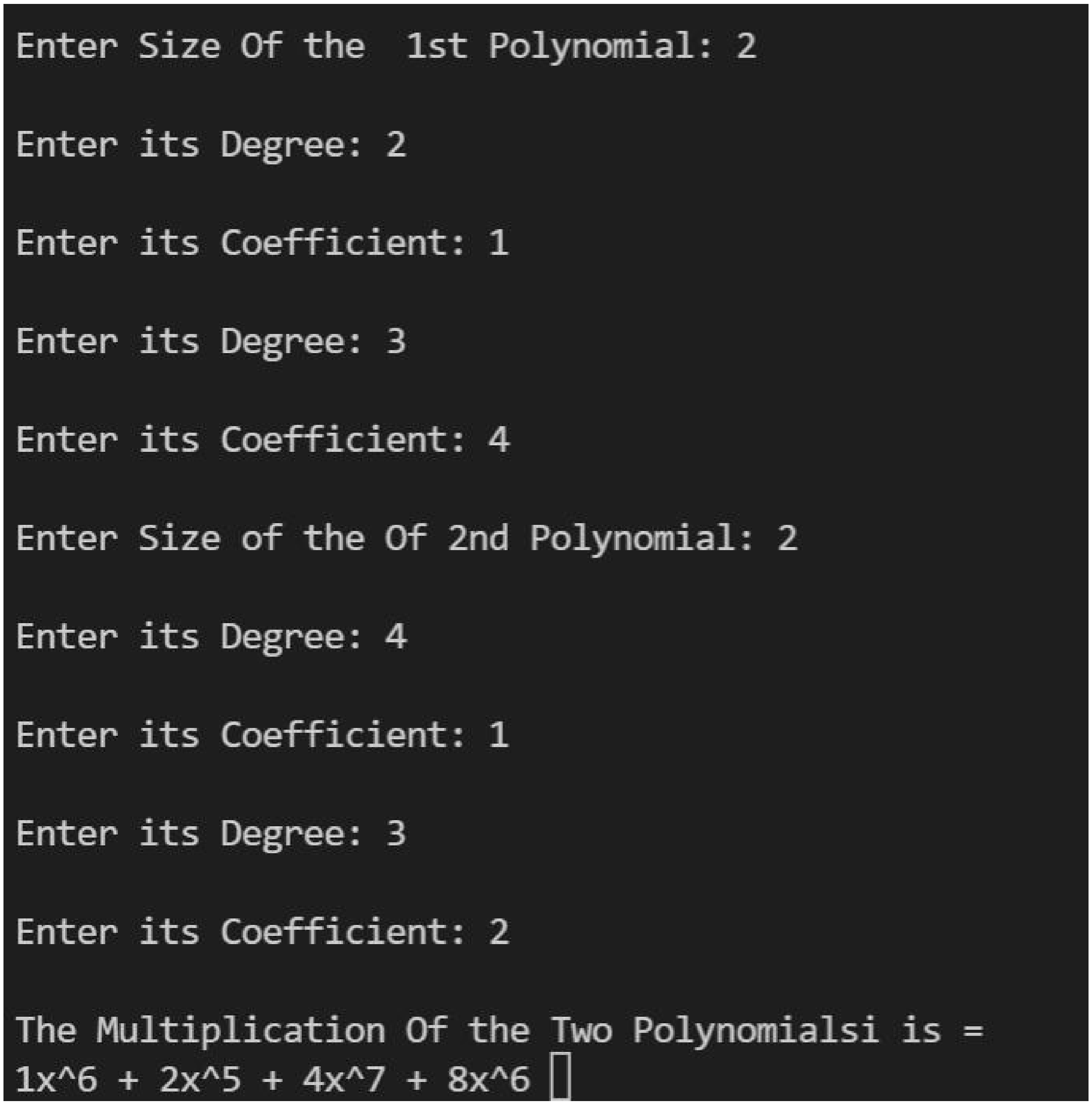
Q3.



```
#include<stdio.h>//By Anusthan Singh (20051337)
#include<conio.h>

struct poly
{
  int degree;
  int coeff;
};
void main ()
{
  struct poly poly1[10], poly2[10], multi[100];
  int n1, n2, count = -1;
```

```c
  int i, j;
  printf ("\nEnter Size Of the  1st Polynomial: ");
  scanf ("%d", &n1);
  for (i = 0; i < n1; i++)
    {
      printf ("\nEnter its Degree: ");
      scanf ("%d", &poly1[i].degree);
      printf ("\nEnter its Coefficient: ");
      scanf ("%d", &poly1[i].coeff);
    }
  printf ("\nEnter Size of the Of 2nd Polynomial: ");
  scanf ("%d", &n2);
  for (i = 0; i < n2; i++)
    {
      printf ("\nEnter its Degree: ");
      scanf ("%d", &poly2[i].degree);
      printf ("\nEnter its Coefficient: ");
      scanf ("%d", &poly2[i].coeff);
    }
  for (i = 0; i < n1; i++)
    {
      for (j = 0; j < n2; j++)
  {
    multi[++count].degree = poly1[i].degree + poly2[j].degree;
    multi[count].coeff = poly1[i].coeff * poly2[j].coeff;
  }
    }
  printf ("\nThe Multiplication Of the Two Polynomialsi is = \n");
  for (i = 0; i <= count; i++)
    {
      if (multi[i].degree == 0)
  printf ("%d ", multi[i].coeff);
      else if (multi[i].degree == 1)
  printf ("%dx ", multi[i].coeff);
      else
  {
    printf ("%dx^%d ", multi[i].coeff, multi[i].degree);
  }
      if (i != count)
  printf ("+ ");
    }
  getch ();
}
```

Output.



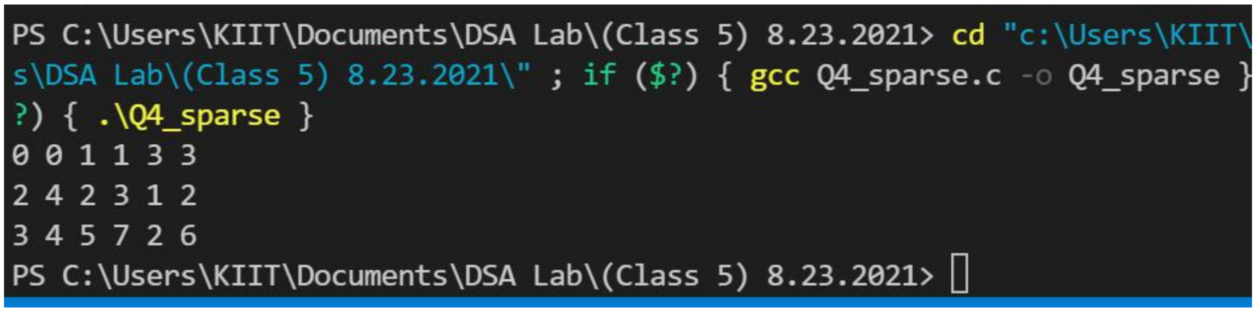
```
Enter Size Of the  1st Polynomial: 2

Enter its Degree: 2

Enter its Coefficient: 1

Enter its Degree: 3

Enter its Coefficient: 4

Enter Size of the Of 2nd Polynomial: 2

Enter its Degree: 4

Enter its Coefficient: 1

Enter its Degree: 3

Enter its Coefficient: 2

The Multiplication Of the Two Polynomialsi is =
1x^6 + 2x^5 + 4x^7 + 8x^6
```

Q4.

```
#include<stdio.h>//By Anusthan Singh (20051337)
int main()
{
    int sparseMatrix[4][5] =
    {
        {0 , 0 , 3 , 0 , 4 },
```

```c
        {0 , 0 , 5 , 7 , 0 },

        {0 , 0 , 0 , 0 , 0 },

        {0 , 2 , 6 , 0 , 0 }
    };

    int size = 0;

    for (int i = 0; i < 4; i++)
        for (int j = 0; j < 5; j++)
            if (sparseMatrix[i][j] != 0)
                size++;

    int compactMatrix[3][size];
    int k = 0;                       // yeha se naya matrix banega

    for (int i = 0; i < 4; i++)
        for (int j = 0; j < 5; j++)
            if (sparseMatrix[i][j] != 0)
            {
                compactMatrix[0][k] = i;
                compactMatrix[1][k] = j;
                compactMatrix[2][k] = sparseMatrix[i][j];
                k++;
            }

    for (int i=0; i<3; i++)
    {
        for (int j=0; j<size; j++)
            printf("%d ", compactMatrix[i][j]);
        printf("\n"); // printing machine

    }
    return 0;
}
```

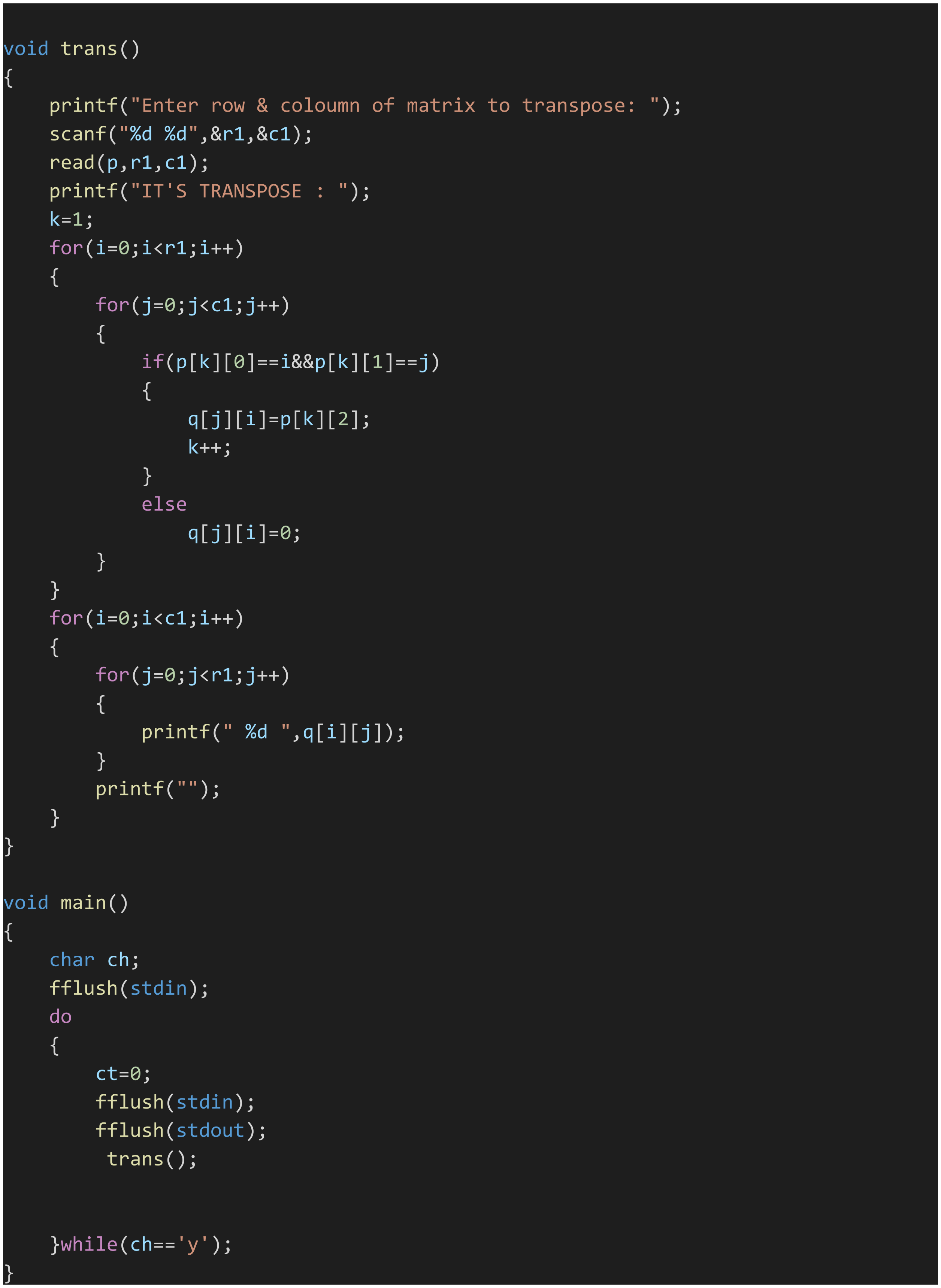
Output.



```
PS C:\Users\KIIT\Documents\DSA Lab\(Class 5) 8.23.2021> cd "c:\Users\KIIT\
s\DSA Lab\(Class 5) 8.23.2021\" ; if ($?) { gcc Q4_sparse.c -o Q4_sparse }
?) { .\Q4_sparse }
0 0 1 1 3 3
2 4 2 3 1 2
3 4 5 7 2 6
PS C:\Users\KIIT\Documents\DSA Lab\(Class 5) 8.23.2021>
```

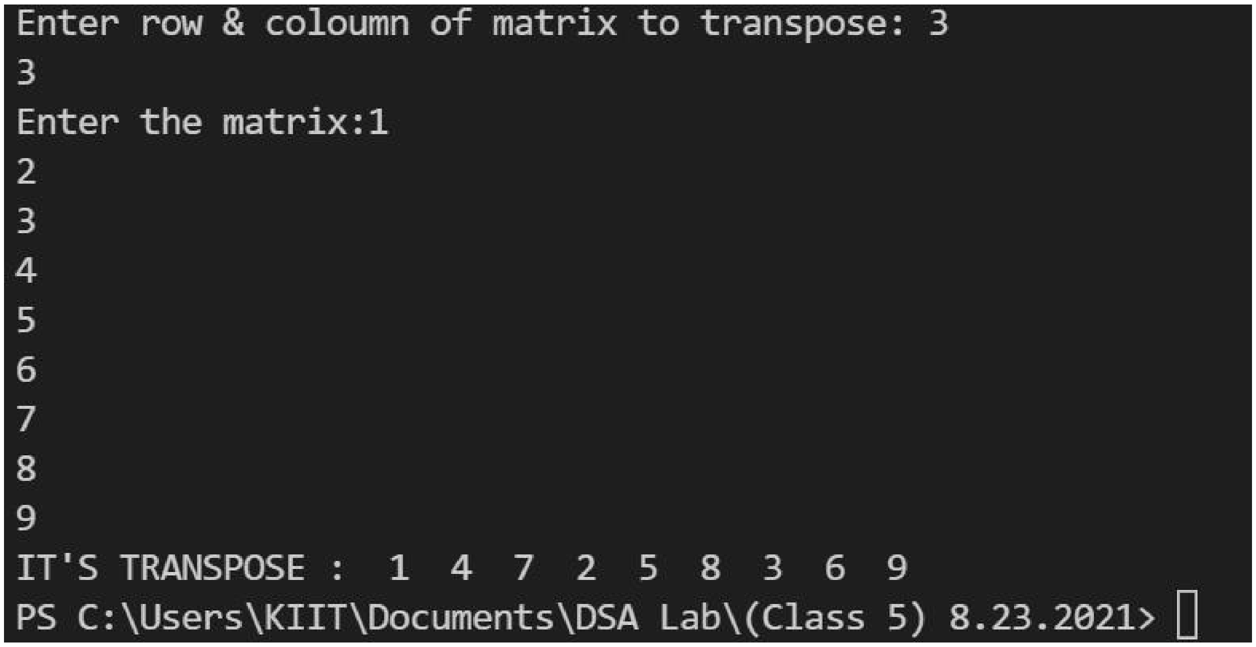
Q5

```
#include<stdio.h>//By Anusthan Singh (20051337)
#include<conio.h>
#include<string.h>
#include<math.h>

int k=1,i,j,m,num,n,p[10][10],q[10][10],ct=0,R=1,C,r1,r2,c1,c2;

void read(int a[10][10],int r,int c)
{
    k=1;
    R=1;
    ct=0;
    printf("Enter the matrix:");
    for(i=0;i<r;i++)
    {
        for(j=0;j<c;j++)
        {
            scanf("%d",&num);
            if(num!=0)
            {
                a[R][C]=i;
                a[R][++C]=j;
                a[R][++C]=num;
                ct++;
                R++;
                C=0;
            }
        }
    }
    a[0][0]=r;
    a[0][1]=c;
    a[0][2]=ct;
}
```



```c
void trans()
{
    printf("Enter row & coloumn of matrix to transpose: ");
    scanf("%d %d",&r1,&c1);
    read(p,r1,c1);
    printf("IT'S TRANSPOSE : ");
    k=1;
    for(i=0;i<r1;i++)
    {
        for(j=0;j<c1;j++)
        {
            if(p[k][0]==i&&p[k][1]==j)
            {
                q[j][i]=p[k][2];
                k++;
            }
            else
                q[j][i]=0;
        }
    }
    for(i=0;i<c1;i++)
    {
        for(j=0;j<r1;j++)
        {
            printf(" %d ",q[i][j]);
        }
        printf("");
    }
}

void main()
{
    char ch;
    fflush(stdin);
    do
    {
        ct=0;
        fflush(stdin);
        fflush(stdout);
         trans();


    }while(ch=='y');
}
```

Output.



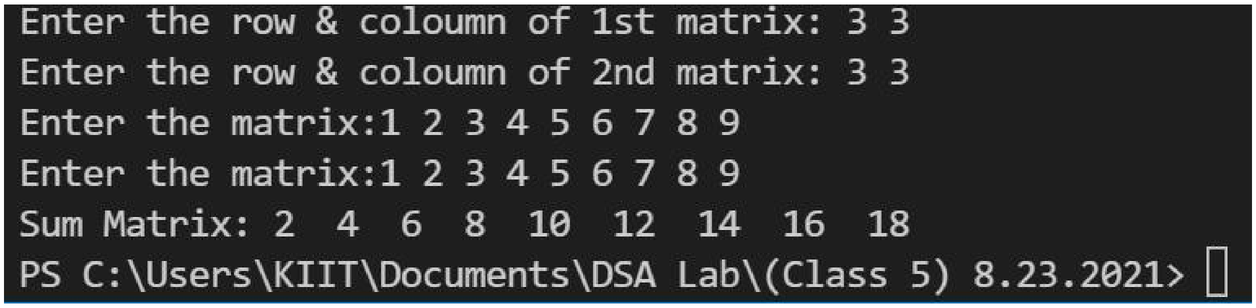
```
Enter row & coloumn of matrix to transpose: 3
3
Enter the matrix:1
2
3
4
5
6
7
8
9
IT'S TRANSPOSE :  1  4  7  2  5  8  3  6  9
PS C:\Users\KIIT\Documents\DSA Lab\(Class 5) 8.23.2021>
```

Q6.

```
#include<stdio.h>//By Anusthan Singh (20051337)

#include<conio.h>
#include<string.h>
#include<math.h>

int k=1,i,j,m,num,n,p[10][10],q[10][10],ct=0,R=1,C,r1,r2,c1,c2;

void read(int a[10][10],int r,int c)
{
    k=1;
    R=1;
    ct=0;
    printf("Enter the matrix:");
    for(i=0;i<r;i++)
    {
        for(j=0;j<c;j++)
        {
            scanf("%d",&num);
            if(num!=0)
            {
                a[R][C]=i;
                a[R][++C]=j;
                a[R][++C]=num;
                ct++;
                R++;
                C=0;
            }
        }
    }
    a[0][0]=r;
    a[0][1]=c;
    a[0][2]=ct;

}

void add()
{
    printf("Enter the row & coloumn of 1st matrix: ");
    scanf("%d %d",&r1,&c1);
    printf("Enter the row & coloumn of 2nd matrix: ");
    scanf("%d %d",&r2,&c2);
    if(r1==r2&&c1==c2)
    {
        read(p,r1,c1);
        read(q,r2,c2);
        k=1;
        printf("Sum Matrix:");
        for(i=0;i<r1;i++)
        {
            for(j=0;j<c1;j++)
            {
                if((p[k][0]==i&&p[k][1]==j)&&(q[k][0]==i&&q[k][1]==j))
                {
                    printf(" %d ",p[k][2]+q[k][2]);
                    k++;
                }
                else if(p[k][0]==i&&p[k][1]==j)
                {
                    printf(" %d ",p[k][2]);
                    k++;
                }
                else if(q[k][0]==i&&q[k][1]==j)
```

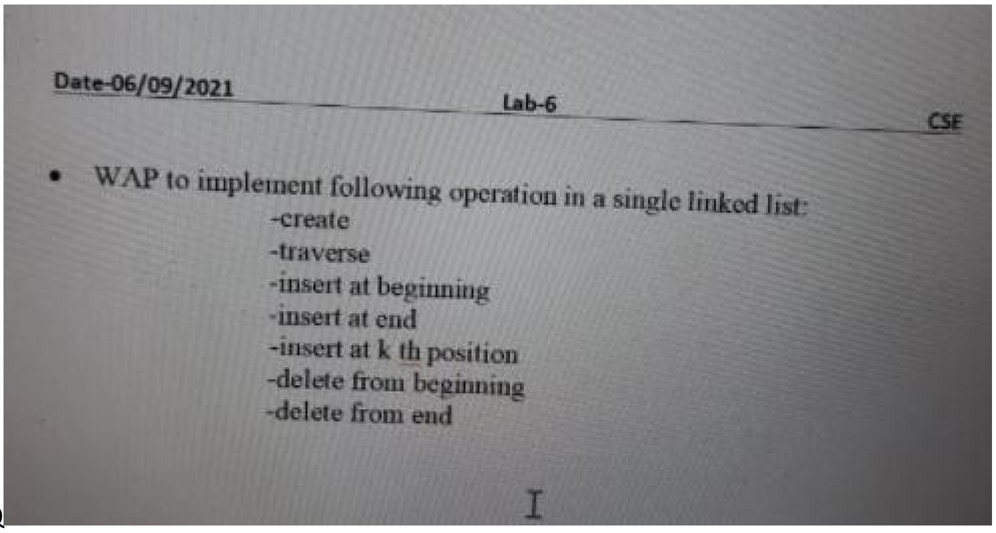
```c
                {
                    printf(" %d ",q[k][2]);
                    k++;
                }
                else
                    printf(" 0 ");
        }
        printf("");
    }
 }
 else
    printf("Addition not possible!");
}

void main()
{
    char ch;
    fflush(stdin);
    do
    {
        ct=0;
        fflush(stdin);
        fflush(stdout);
            add();
    }while(ch=='y');
}
```

Output .



```
Enter the row & coloumn of 1st matrix: 3 3
Enter the row & coloumn of 2nd matrix: 3 3
Enter the matrix:1 2 3 4 5 6 7 8 9
Enter the matrix:1 2 3 4 5 6 7 8 9
Sum Matrix: 2  4  6  8  10  12  14  16  18
PS C:\Users\KIIT\Documents\DSA Lab\(Class 5) 8.23.2021>
```

Date – 6/9/2021

Q

Date-06/09/2021 Lab-6 CSE

- WAP to implement following operation in a single linked list:
  - -create
  - -traverse
  - -insert at beginning
  - -insert at end
  - -insert at k th position
  - -delete from beginning
  - -delete from end

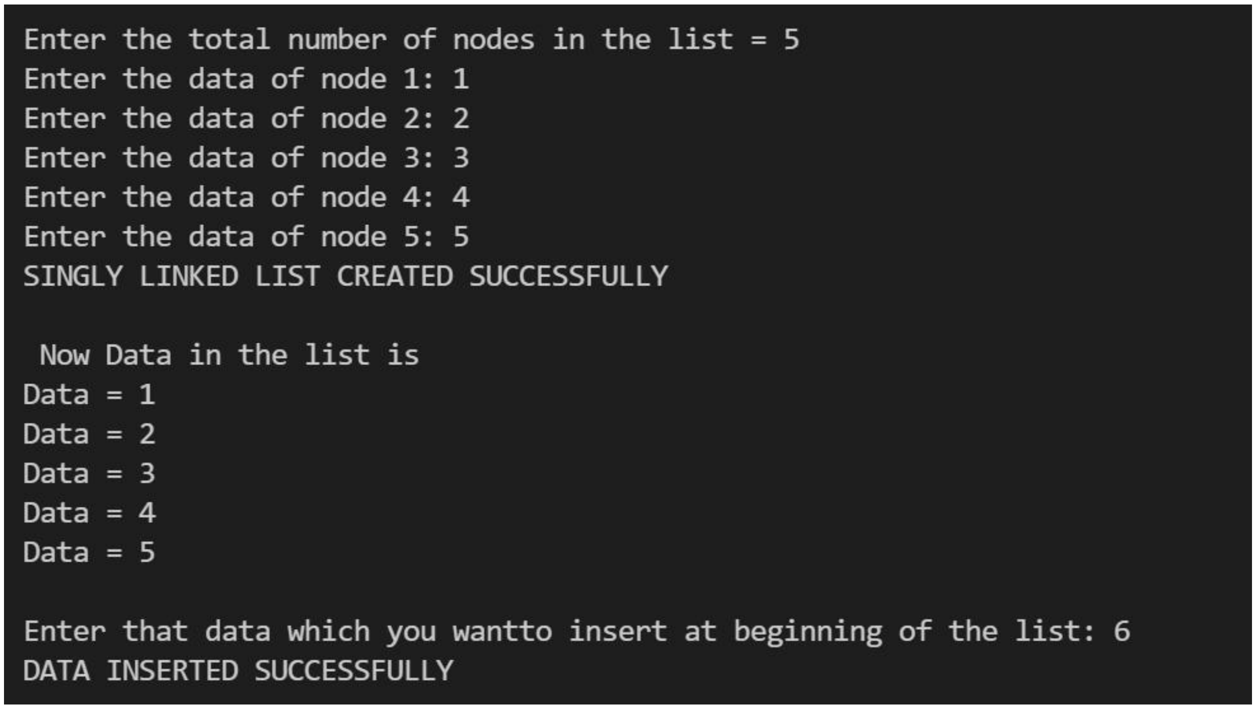
Q1.

```
#include <stdio.h>//By Anusthan Singh (20051337)
#include <stdlib.h>



struct node {
    int data;//data
    struct node *next; // Address
}*head;


void creatingList(int n);
void insertNodeAtBeginning(int NUMBER);
void insertNodeAtheEnd(int NUMBER);
void insertNodeAtheMiddle(int NUMBER, int pos);
void deletethefirstnode();
void deletethelastnode();
void displaythatList();


int main()
{
    int n, data, position, choice;


      //Create a singly linked list of n nodes
```

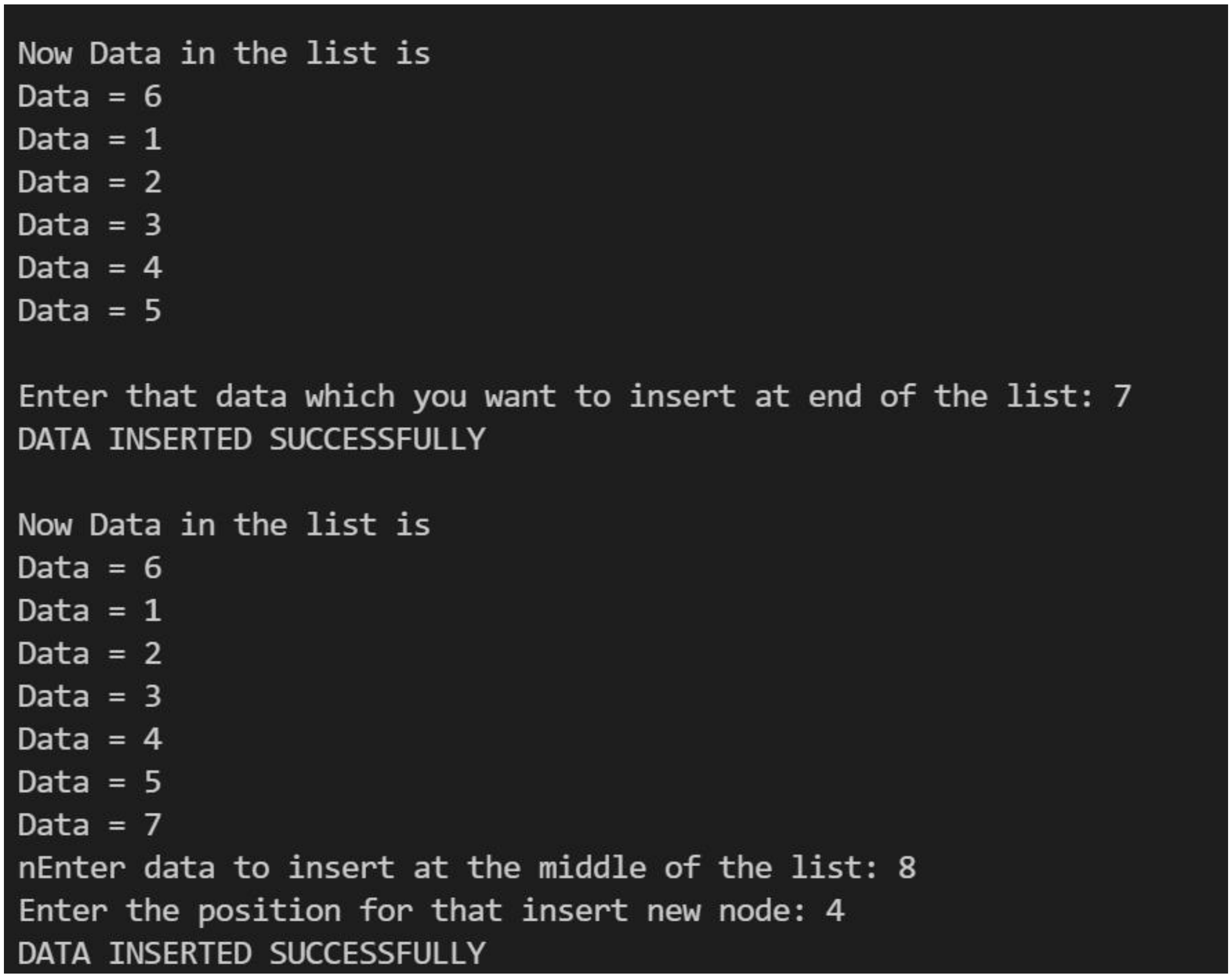
```c
    printf("Enter the total number of nodes in the list = ");
    scanf("%d", &n);
    creatingList(n);

    printf("\n Now Data in the list is \n");
    displaythatList();

     // Insert data at the beginning of the singly linked list

    printf("\nEnter that data which you wantto insert at beginning of the list: ");

    scanf("%d", &data);
    insertNodeAtBeginning(data);

    printf("\nNow Data in the list is \n");
    displaythatList();


     // Insert data at the end of the singly linked list

    printf("\nEnter that data which you want to insert at end of the list: ");
    scanf("%d", &data);
    insertNodeAtheEnd(data);

    printf("\nNow Data in the list is \n");
    displaythatList();


     // Insert data at middle of the singly linked list

    printf("nEnter data to insert at the middle of the list: ");
    scanf("%d", &data);
    printf("Enter the position for that insert new node: " );
    scanf("%d", &position);
    insertNodeAtheMiddle(data, position);

    printf("\nNow Data in the list is \n");
    displaythatList();

    printf("\nPress 1 to delete the first node: ");
    scanf("%d", &choice);

    /* Delete first node from list */
    if(choice == 1)
        deleteFirstNode();
    printf("\nNow Data in the list is \n");
    displaythatList();

    printf("\nPress 2 to delete last node: ");
    scanf("%d", &choice);

    /* Delete last node from list */
    if(choice == 2)
        deleteLastNode();

    printf("\nNow Data in the list is \n");
    displaythatList();


    return 0;
}



void creatingList(int n)//n node
{
    struct node *newNode, *temp;
    int data, i;

    head = (struct node *)malloc(sizeof(struct node));

    if(head == NULL)
    {
        printf("Unable to allocate memory.");
    }
    else
    {
        printf("Enter the data of node 1: ");
        scanf("%d", &data);

        head->data = data; // Link data field to data
        head->next = NULL; // Link address field to NULL

        temp = head;

        /*
         * Create n nodes and adds to linked list
         */
        for(i=2; i<=n; i++)
        {
            newNode = (struct node *)malloc(sizeof(struct node));


            if(newNode == NULL)
            {
                printf("Unable to allocate memory.");
                break;
            }
            else
            {
                printf("Enter the data of node %d: ", i);
                scanf("%d", &data);

                newNode->data = data; // Link data field of newNode with data
                newNode->next = NULL; // Link address field of newNode with NULL

                temp-
>next = newNode; // Link previous node i.e. temp to the newNode

                temp = temp->next;
            }
        }

        printf("SINGLY LINKED LIST CREATED SUCCESSFULLY\n");
    }
}

//1 insert new node at beginning(create new node)
void insertNodeAtBeginning(int data)
{
    struct node *newNode;

    newNode = (struct node*)malloc(sizeof(struct node));

    if(newNode == NULL)
    {
        printf("Unable to allocate memory.");
    }
    else
    {
        newNode->data = data; // Link data part
        newNode->next = head; // Link address part

        head = newNode;
```

```c
        printf("DATA INSERTED SUCCESSFULLY\n");
    }
}


 // inserts at the end of the linked list.(create new node)

void insertNodeAtheEnd(int data)
{
    struct node *newNode, *temp;

    newNode = (struct node*)malloc(sizeof(struct node));

    if(newNode == NULL)
    {
        printf("Unable to allocate memory.");
    }
    else
    {
        newNode->data = data; // Link the data part
        newNode->next = NULL;

        temp = head;

        // Traverse to  last (node)
        while(temp != NULL && temp->next != NULL)
            temp = temp->next;

        temp->next = newNode; // Link address part

        printf("DATA INSERTED SUCCESSFULLY\n");
    }
}
 //inserts at middle of the linked list.

void insertNodeAtheMiddle(int data, int position)
{
    int i;
    struct node *newNode, *temp;

    newNode = (struct node*)malloc(sizeof(struct node));

    if(newNode == NULL)
    {
        printf("Unable to allocate memory.");
    }
    else
    {
        newNode->data = data; // Link data part
        newNode->next = NULL;

        temp = head;

        for(i=2; i<=position-1; i++) // Traverse to the n-1 position
        {
            temp = temp->next;

            if(temp == NULL)
                break;
        }

        if(temp != NULL)
        {
            /* Link address part of new node */
            newNode->next = temp->next;

            /* Link address part of n-1 node */
            temp->next = newNode;

            printf("DATA INSERTED SUCCESSFULLY\n");
        }
        else
        {
            printf("UNABLE TO INSERT DATA AT THE GIVEN POSITION\n");
        }
    }
}

//Deletes the first node

void deleteFirstNode()
{
    struct node *toDelete;

    if(head == NULL)
    {
        printf("List is already empty.");
    }
    else
    {
        toDelete = head;
        head = head->next;

        printf("\nData deleted = %d\n", toDelete->data);

                             // Clears the memory OF first node
        free(toDelete);

        printf("DELETETION DONE FOR FIRST NODE  FROM LIST\n");
    }
}


 // Delete last node of the linked list

void deleteLastNode()
{
    struct node *toDelete, *secondLastNode;

    if(head == NULL)
    {
        printf("List is already empty.");
    }
    else
    {
        toDelete = head;
        secondLastNode = head;

        // Traverse to the last node
        while(toDelete->next != NULL)
        {
            secondLastNode = toDelete;
            toDelete = toDelete->next;
        }

        if(toDelete == head)
        {
            head = NULL;
        }
        else
        {
            secondLastNode-
>next = NULL;                                      /* Disconnect link of secon
d last node with last node */
        }


        free(toDelete);

        printf("DELETETION DONE FOR LAST NODE OF LIST \n");
    }
}




/*
 * Display entire list
 */
void displaythatList()
{
    struct node *temp;

    /*
     * If the list is empty i.e. head = NULL
     */
    if(head == NULL)
    {
        printf("List is empty.");
    }
    else
    {
        temp = head;
        while(temp != NULL)
        {
            printf("Data = %d\n", temp->data); // Print data of current node
            temp = temp->next;                 // Move to next node
        }
    }
}
```

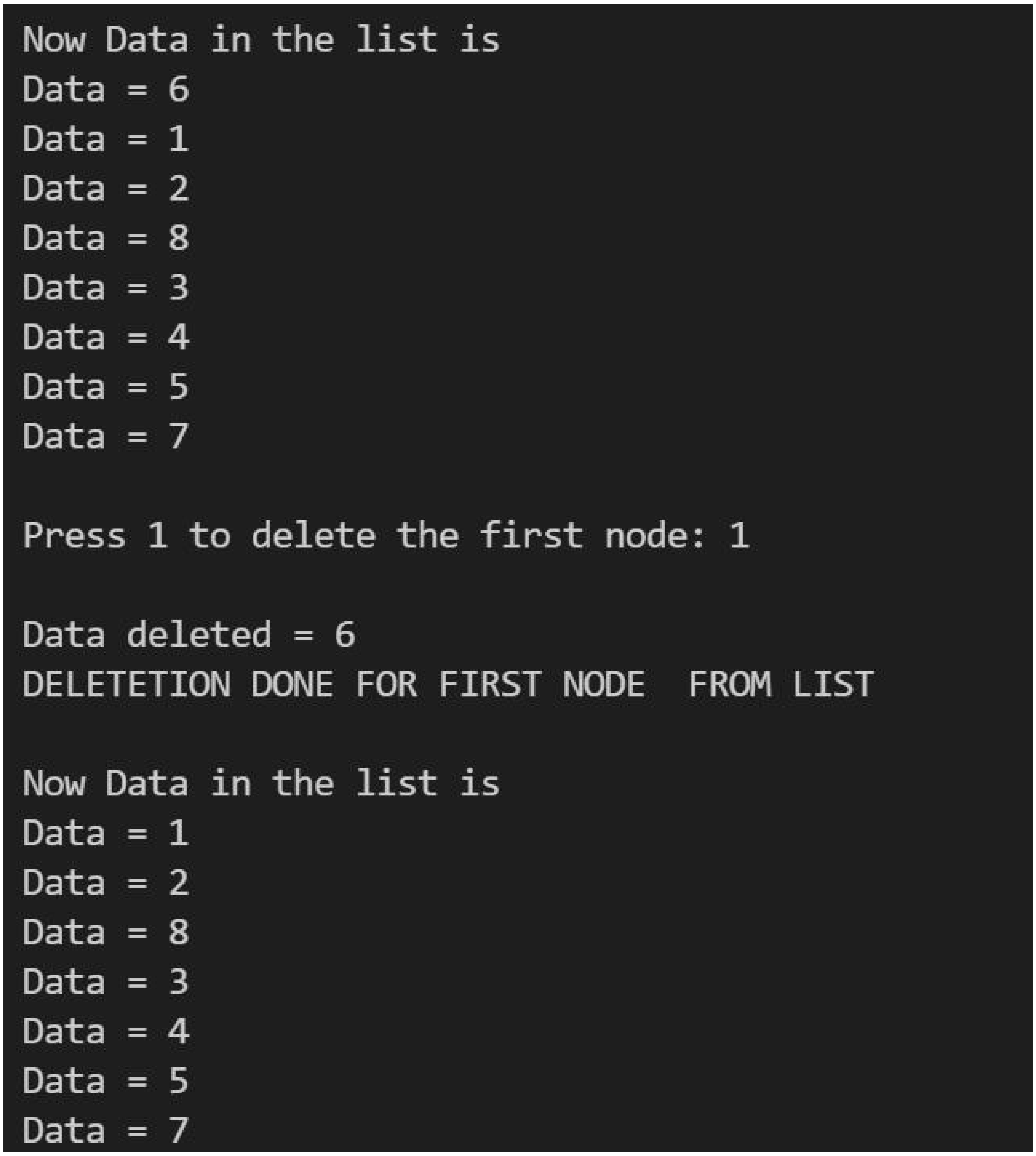
Output .



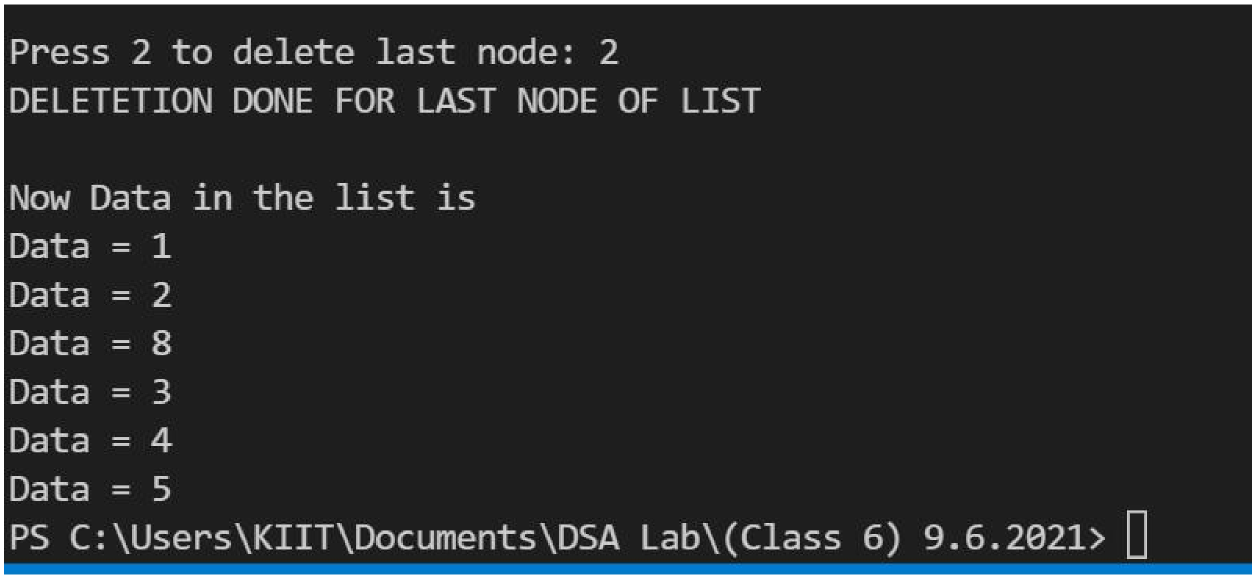
```
Enter the total number of nodes in the list = 5
Enter the data of node 1: 1
Enter the data of node 2: 2
Enter the data of node 3: 3
Enter the data of node 4: 4
Enter the data of node 5: 5
SINGLY LINKED LIST CREATED SUCCESSFULLY

 Now Data in the list is
Data = 1
Data = 2
Data = 3
Data = 4
Data = 5

Enter that data which you wantto insert at beginning of the list: 6
DATA INSERTED SUCCESSFULLY
```



```
Now Data in the list is
Data = 6
Data = 1
Data = 2
Data = 3
Data = 4
Data = 5

Enter that data which you want to insert at end of the list: 7
DATA INSERTED SUCCESSFULLY

Now Data in the list is
Data = 6
Data = 1
Data = 2
Data = 3
Data = 4
Data = 5
Data = 7
nEnter data to insert at the middle of the list: 8
Enter the position for that insert new node: 4
DATA INSERTED SUCCESSFULLY
```



```
Now Data in the list is
Data = 6
Data = 1
Data = 2
Data = 8
Data = 3
Data = 4
Data = 5
Data = 7

Press 1 to delete the first node: 1

Data deleted = 6
DELETETION DONE FOR FIRST NODE  FROM LIST

Now Data in the list is
Data = 1
Data = 2
Data = 8
Data = 3
Data = 4
Data = 5
Data = 7
```



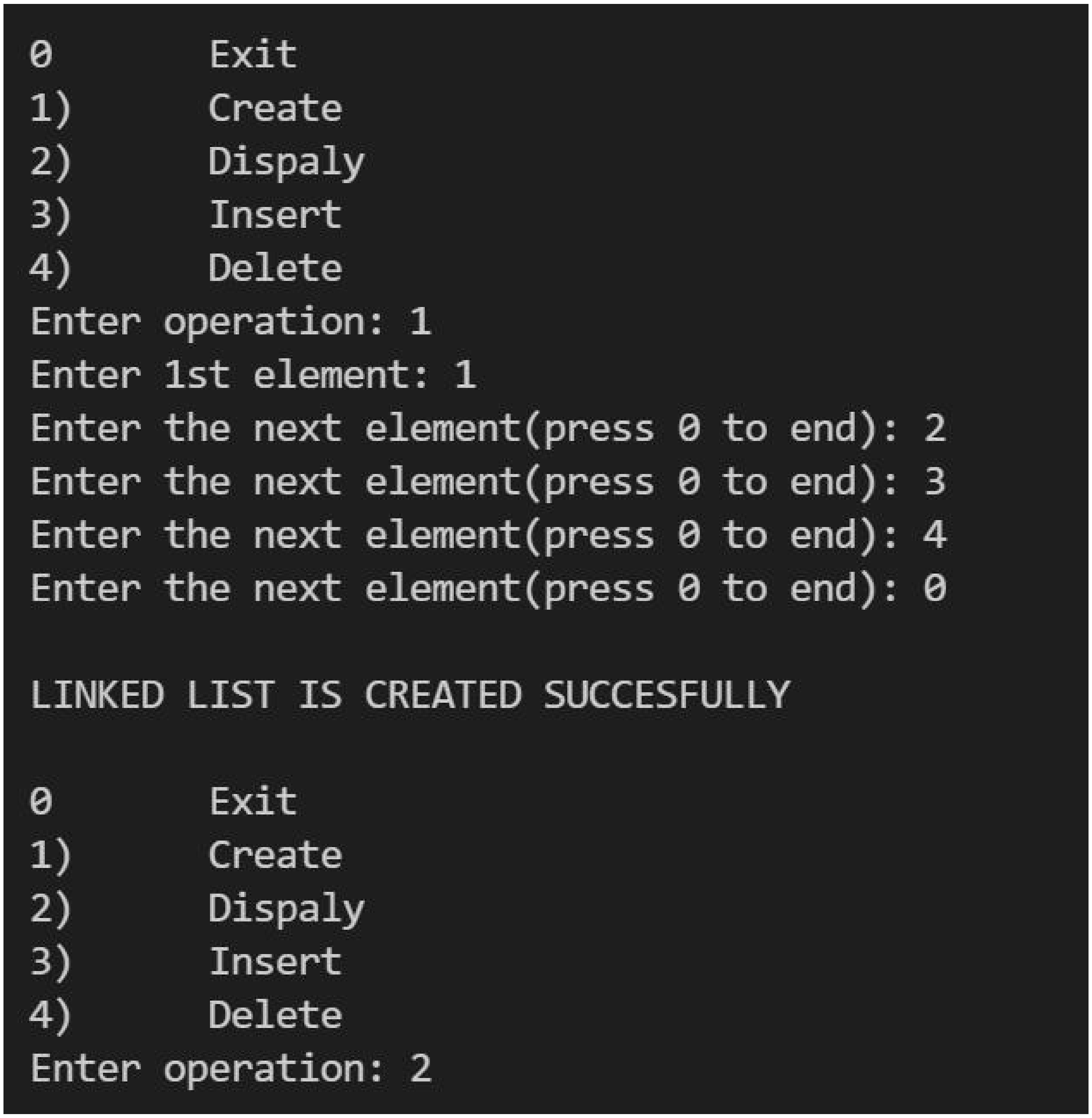
```
Press 2 to delete last node: 2
DELETETION DONE FOR LAST NODE OF LIST

Now Data in the list is
Data = 1
Data = 2
Data = 8
Data = 3
Data = 4
Data = 5
PS C:\Users\KIIT\Documents\DSA Lab\(Class 6) 9.6.2021>
```

Q// Same question with switch case(simple)

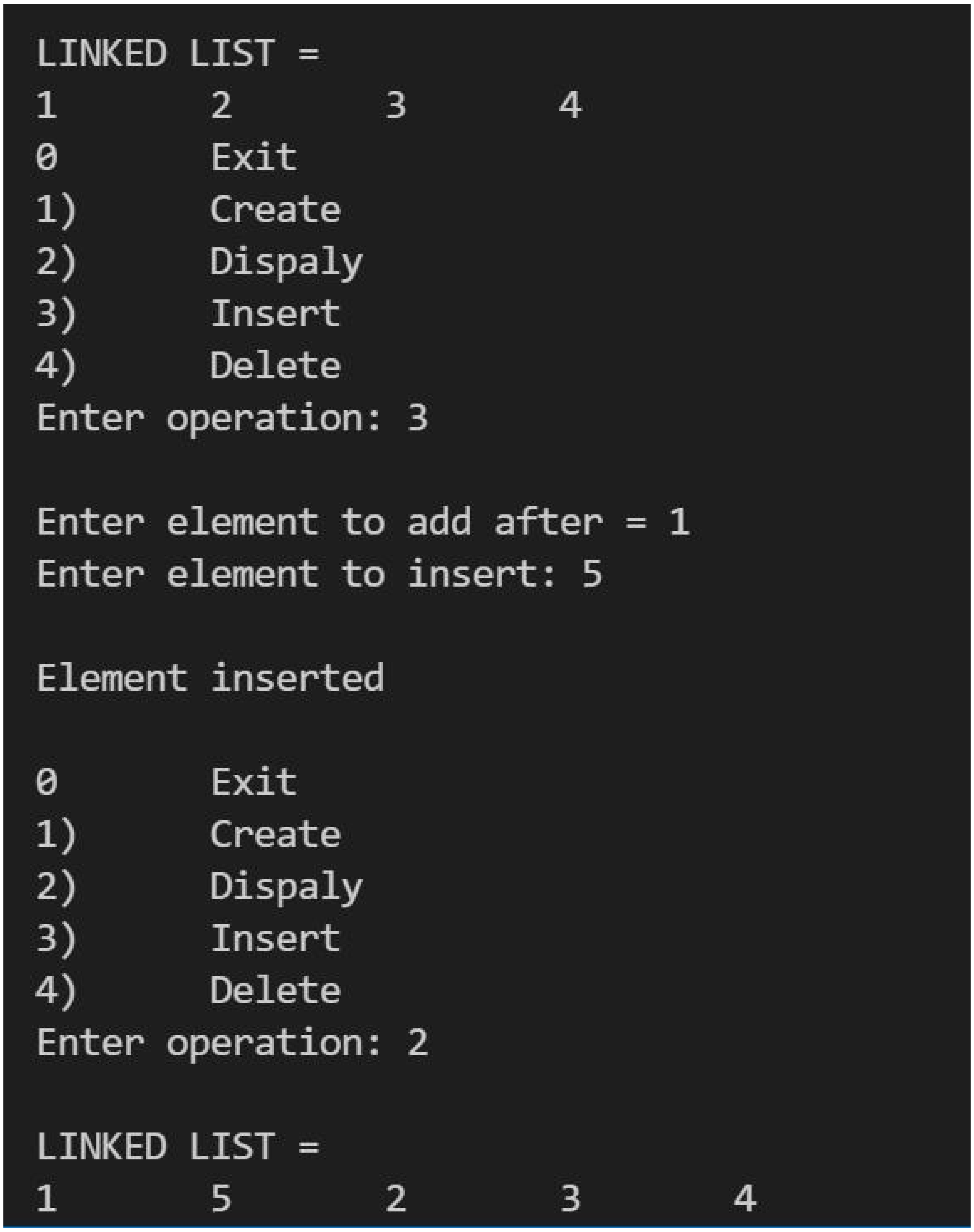
```c
#include <stdio.h>
#include <stdlib.h>

struct node{
int data;
struct node *next;
}*head=NULL;

void create(){
struct node *ptr,*last;

head=(struct node*)malloc(sizeof(struct node));

printf("Enter 1st element: ");
scanf("%d",&head->data);
head->next=NULL;

last=head;
while(1){
 int temp;
 printf("Enter the next element(press 0 to end): ");
 scanf("%d",&temp);
 if(temp==0)
 break;
 else{
```

```c
 ptr=(struct node*)malloc(sizeof(struct node));
 ptr->data=temp;
 last->next=ptr;
 ptr->next=NULL;
 last=ptr;
 }
 }
printf("\nLINKED LIST IS CREATED SUCCESFULLY\n");
}

void displaythatList(){
struct node *ptr;
ptr=head;
printf("\nLINKED LIST = \n");
while(ptr!=NULL){
 printf("%d\t",ptr->data);
 ptr=ptr->next;
}
}

void search(){
struct node* ptr;
int count=0,temp;
printf("\nEnter element to search: ");
scanf("%d",&temp);
ptr=head;
while(ptr!=NULL && temp!=ptr->data){
 count++;
 ptr=ptr->next;
}
 printf("\nelement found at %d position\n",count+1);
}
void insert(){
struct node *ptr,*temp;
int s;
printf("\nEnter element to add after = ");
scanf("%d",&s);
ptr=head;
while(ptr!=NULL && s!=ptr->data){
 ptr=ptr->next;
}
 temp=(struct node*)malloc(sizeof(struct node));
 printf("\nEnter element to insert: ");
 scanf("%d",&temp->data);
 temp->next=ptr->next;
 ptr->next=temp;
 printf("\nElement inserted\n");
}
void dlt(){
 struct node *ptr,*temp;
 int s;
 printf("\nEnter element to delete: ");
 scanf("%d",&s);
 ptr=head;
 while(s!=(ptr->next)->data){
 ptr=ptr->next;
 }
 ptr->next=ptr->next->next;
}
int main(void){
 int caseno;
 printf("\n0\tExit\n1)\tCreate\n2)\tDispaly\n3)\tInsert\n4)\tDelete\n");
 printf("Enter operation: ");
 scanf("%d",&caseno);
 switch (caseno){
 case 0:
 exit(1);
 case 1:
 create();
 main();
 case 2:
 displaythatList();
 main();
 case 3:
 insert();
 main();
 case 4:
 dlt();
 main();
 } }
```

Output:-

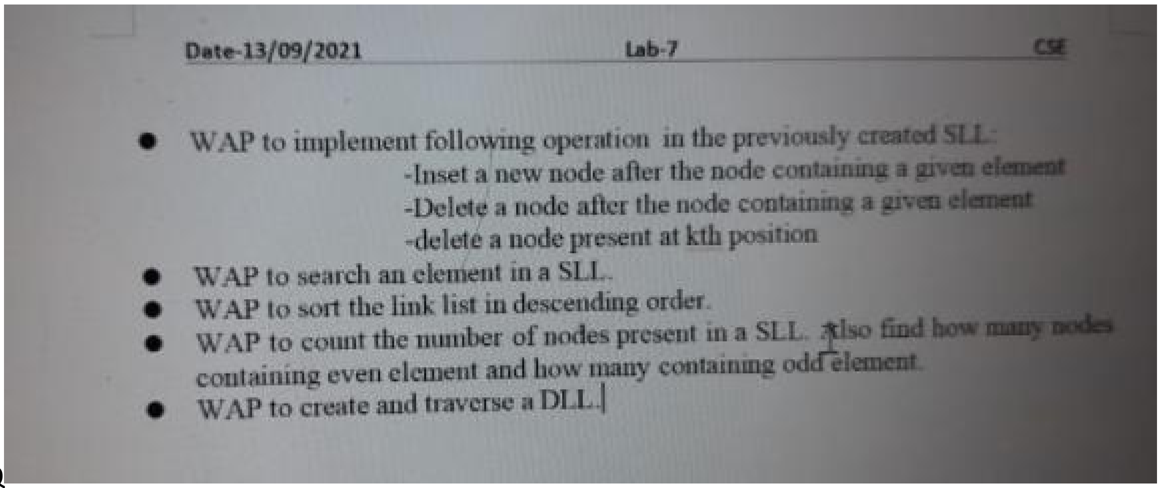


```
0       Exit
1)      Create
2)      Dispaly
3)      Insert
4)      Delete
Enter operation: 1
Enter 1st element: 1
Enter the next element(press 0 to end): 2
Enter the next element(press 0 to end): 3
Enter the next element(press 0 to end): 4
Enter the next element(press 0 to end): 0

LINKED LIST IS CREATED SUCCESFULLY

0       Exit
1)      Create
2)      Dispaly
3)      Insert
4)      Delete
Enter operation: 2
```



```
LINKED LIST =
1       2       3       4
0       Exit
1)      Create
2)      Dispaly
3)      Insert
4)      Delete
Enter operation: 3

Enter element to add after = 1
Enter element to insert: 5

Element inserted

0       Exit
1)      Create
2)      Dispaly
3)      Insert
4)      Delete
Enter operation: 2

LINKED LIST =
1       5       2       3       4
```

Date – 13/8/2021


Date-13/09/2021 Lab-7 CSE

- WAP to implement following operation in the previously created SLL:
  - -Inset a new node after the node containing a given element
  - -Delete a node after the node containing a given element
  - -delete a node present at kth position
- WAP to search an element in a SLL.
- WAP to sort the link list in descending order.
- WAP to count the number of nodes present in a SLL. Also find how many nodes containing even element and how many containing odd element.
- WAP to create and traverse a DLL.

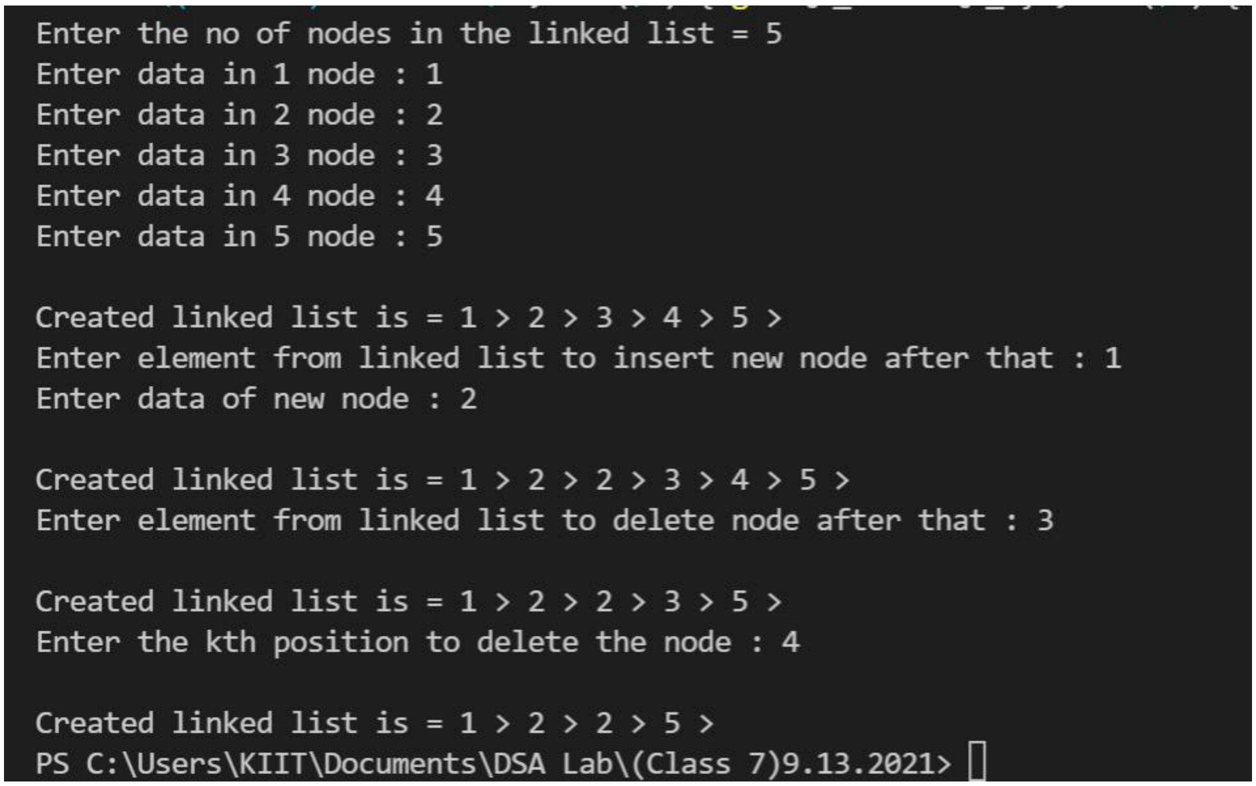
Q

Q1.// Without switch case

```
#include<stdio.h>
#include<conio.h>
#include<stdlib.h>
typedef struct Node
{
     int data;
     struct Node *next;
}node;
node *head;

node* createnewlinkedlist(int);
void traverselinkedlist (node *head);
void insertNode();
void deleteNode();
void DeletedNodeatK();
int main()
{
    int n;
    printf("Enter the no of nodes in the linked list = ");
    scanf("%d",&n);
    head = createnewlinkedlist(n);
    traverselinkedlist(head);
    insertNode();
    deleteNode();
    DeletedNodeatK();
    return 0;
```

```c
    getch();
}

node* createnewlinkedlist(int n){
    node *head=NULL,*temp,*p;
    for(int i=0;i<n;i++){
        temp= (node*)malloc(sizeof(node));
        printf("Enter data in %d node : ",i+1);
        scanf("%d",&(temp->data));
        temp->next=NULL;

        if(head==NULL)
        head = temp;
        else{
            p=head;
            while(p->next != NULL)
            p = p->next;
            p->next = temp;
        }
    }
    return head;
}

void traverselinkedlist(node *head){
    node *temp = head;
    if(temp == NULL)
    printf("Linked list is empty \n");
    else{
        printf("\nCreated linked list is = ");
        while(temp != NULL){
        printf("%d -> ",temp->data);
        temp = temp->next;
        }
    }
}

void insertNode(){
    int ele;
    printf("\nEnter element from linked list to insert new node after that : ");
    scanf("%d",&ele);
    node *newNode=NULL,*temp,*p;
    newNode = (node*)malloc(sizeof(node));
    printf("Enter data of new node : ");
    scanf("%d",&(newNode->data));
    newNode->next= NULL;
    temp = head;
    while(temp->next != NULL){
        if(temp->data == ele){
            newNode->next = temp->next;
            temp->next= newNode;
            break;
        }
        else
        temp=temp->next;
    }
    if(temp->next == NULL)
    {
         newNode->next = temp->next;
            temp->next= newNode;
    }
    traverselinkedlist(head);
}

void deleteNode(){
    int delete;
    printf("\nEnter element from linked list to delete node after that : ");
    scanf("%d",&delete);

    node *p,*q;
    p = head;
    while(p->next != NULL){
        if(p->data == delete){
           break;
        }
        else
        p = p->next;
    }
           q = p->next;
           p->next = q->next;
           q->next = NULL;
           free(q);
    traverselinkedlist(head);
}

void DeletedNodeatK(){
    int k;
    printf("\nEnter the kth position to delete the node : ");
    scanf("%d",&k);
   node *p,*q;
   p = head;
   while(k>2){
   p = p->next;
   --k;
   }

   q = p->next;
   p->next = q->next;
   q->next = NULL;
   free(q);
    traverselinkedlist(head);
}
```

Output:-



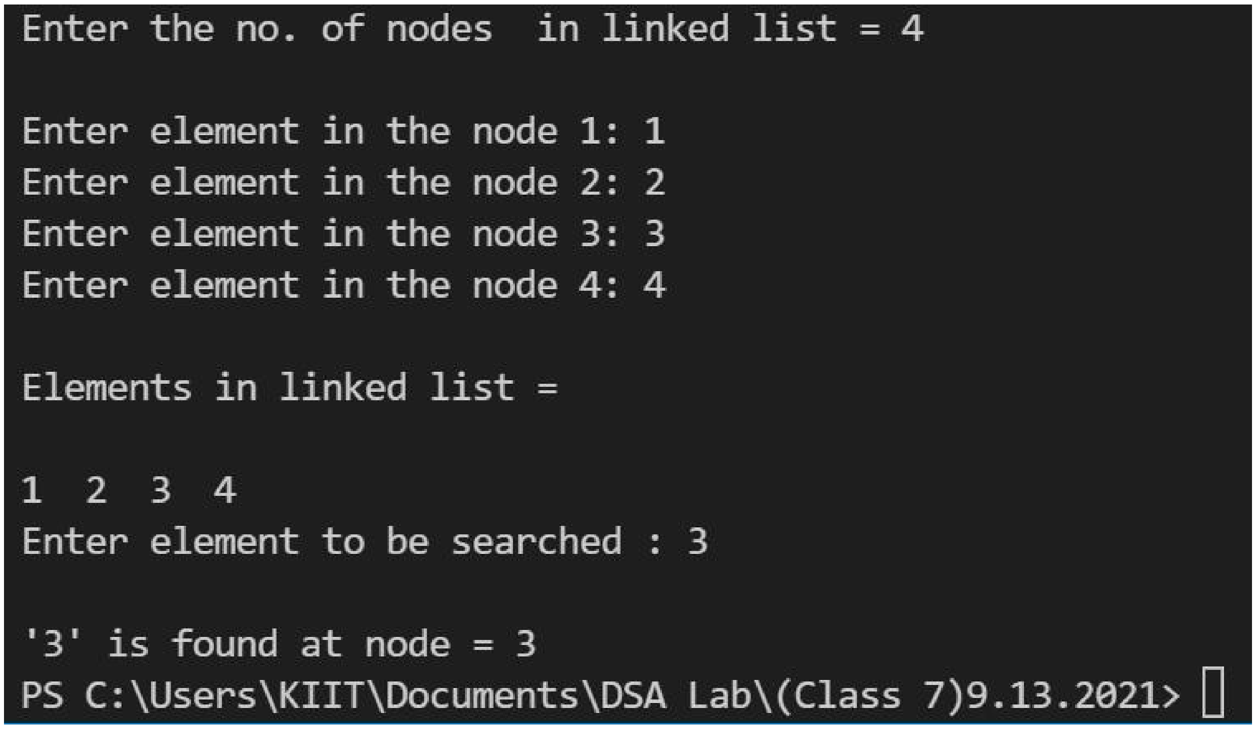
```
Enter the no of nodes in the linked list = 5
Enter data in 1 node : 1
Enter data in 2 node : 2
Enter data in 3 node : 3
Enter data in 4 node : 4
Enter data in 5 node : 5

Created linked list is = 1 > 2 > 3 > 4 > 5 >
Enter element from linked list to insert new node after that : 1
Enter data of new node : 2

Created linked list is = 1 > 2 > 2 > 3 > 4 > 5 >
Enter element from linked list to delete node after that : 3

Created linked list is = 1 > 2 > 2 > 3 > 5 >
Enter the kth position to delete the node : 4

Created linked list is = 1 > 2 > 2 > 5 >
PS C:\Users\KIIT\Documents\DSA Lab\(Class 7)9.13.2021>
```

Q2.

```
#include<stdio.h>
#include<malloc.h>//By Anusthan Singh (20051337)
struct node
{
    int data;
    struct node *next;
}
first, *new;

int search(int item)
{
    int count=1;
    new=&first;
    while(new->next!=NULL)
    {
        if(new->data==item)
            break;
        else
            count++;
        new=new->next;
    }
    return count;
}
int main()
{
    int number,i,searching,position;

    first.next=NULL;
    new=&first;
    printf("Enter the no. of nodes  in linked list = ");
    scanf("%d",&number);
    printf("\n");
    for(i=0;i< number;i++)
    {
        new->next=(struct node *)malloc(sizeof(struct node));

        printf("Enter element in the node %d: ",i+1);
        scanf("%d",&new->data);
        new=new->next;
    }
    new->next=NULL;
    printf("\nElements in linked list = \n\n");
    new=&first;
    while(new->next!=NULL)
    {
        printf("%d  ",new->data);
        new=new->next;
    }
    printf("  ");
```

```c
    printf("\nEnter element to be searched : ");
    scanf("%d",&searching);

    position=search(searching);
    if(position<=number)
        printf("\n'%d' is found at node = %d",searching,position);
    else
        printf("The number '%d' is not in linked list.",searching);
    return 0;
}
```

Output .



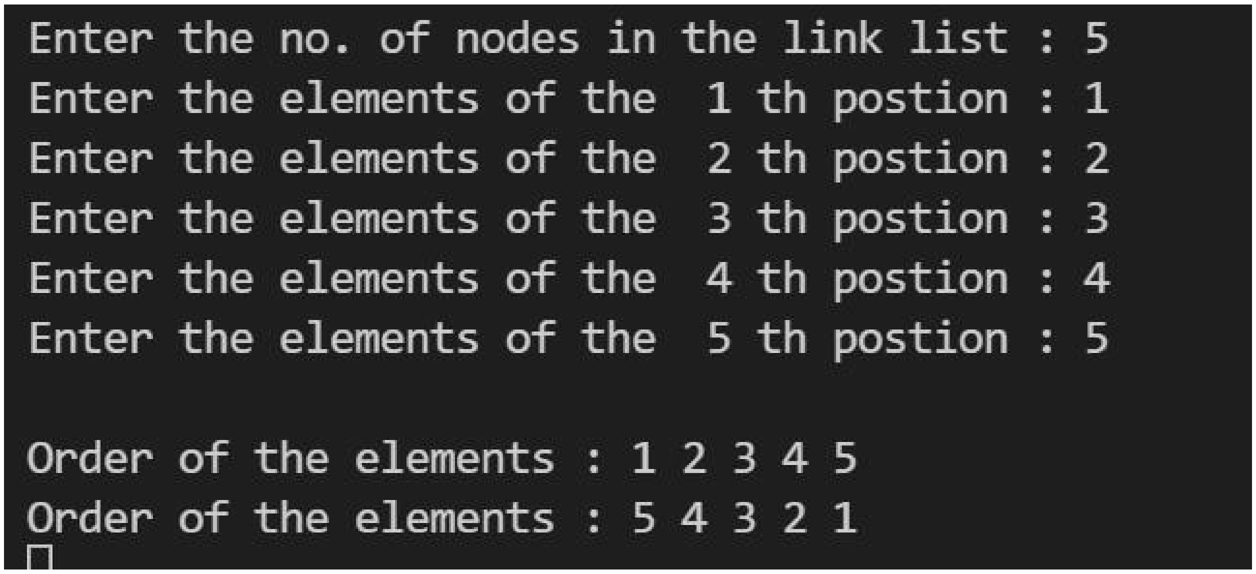
```
Enter the no. of nodes  in linked list = 4

Enter element in the node 1: 1
Enter element in the node 2: 2
Enter element in the node 3: 3
Enter element in the node 4: 4

Elements in linked list =

1  2  3  4
Enter element to be searched : 3

'3' is found at node = 3
PS C:\Users\KIIT\Documents\DSA Lab\(Class 7)9.13.2021>
```

Q3.

```c
#include<stdio.h>
#include<conio.h>
#include<stdlib.h>
struct node
{
    int data;
    struct node *next;
```

```c
}*head=NULL;
void arranging(struct node *h)
{
    struct node *current,*ptr;
    int i,j,n;
    for(ptr=h;ptr!=NULL;ptr=ptr->next)
    {
        for(current=ptr->next;current!=NULL;current=current->next)
        {
            if(ptr->data<current->data)
            {
                n=ptr->data;
                ptr->data=current->data;
                current->data=n;
            }
        }
    }
}
void desending(struct node *h)
{
    struct node *current;
    current=h;
    printf("\nOrder of the elements : ");
    while(current!=NULL)
    {
        printf("%d ",current->data);
        current=current->next;
    }
}
void main()
{
    struct node *current,*ptr;
    int n,i,ch,d=1;
    printf("Enter the no. of nodes in the link list : ");
    scanf("%d",&n);
    for(i=0;i<n;i++)
    {
       current=malloc(sizeof(struct node));
       printf("Enter the elements of the  %d th postion : ",(i+1));
       scanf("%d",&current->data);
       current->next=NULL;
       if(head==NULL)
       {
          head=current;
          ptr=current;
       }
       else
       {
           ptr->next=current;
           ptr=current;
       }
    }
    desending(head);
    arranging(head);
    desending(head);
    printf("\n");
   getch();
}
```

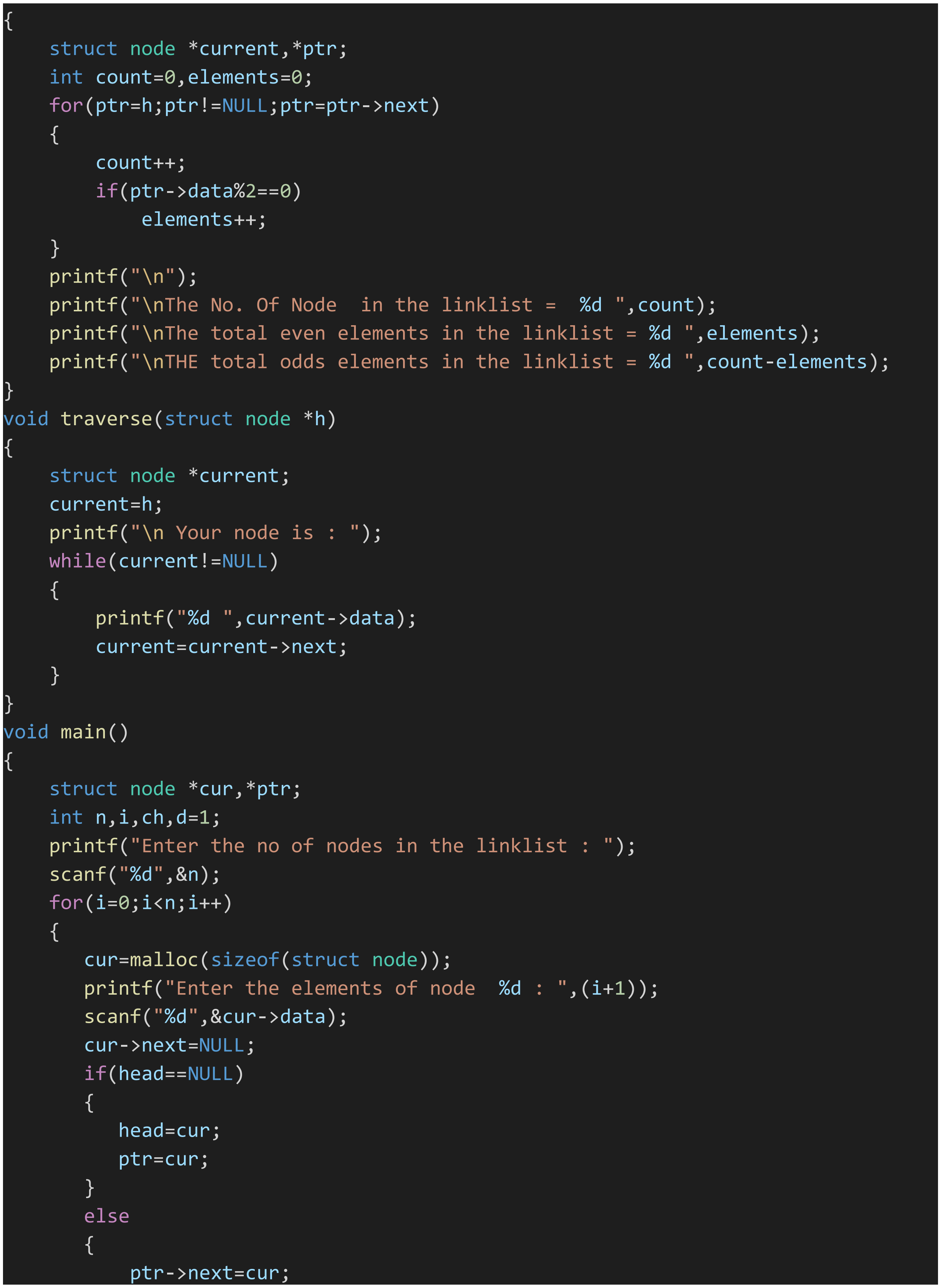
Output:-



```
Enter the no. of nodes in the link list : 5
Enter the elements of the  1 th postion : 1
Enter the elements of the  2 th postion : 2
Enter the elements of the  3 th postion : 3
Enter the elements of the  4 th postion : 4
Enter the elements of the  5 th postion : 5

Order of the elements : 1 2 3 4 5
Order of the elements : 5 4 3 2 1
```

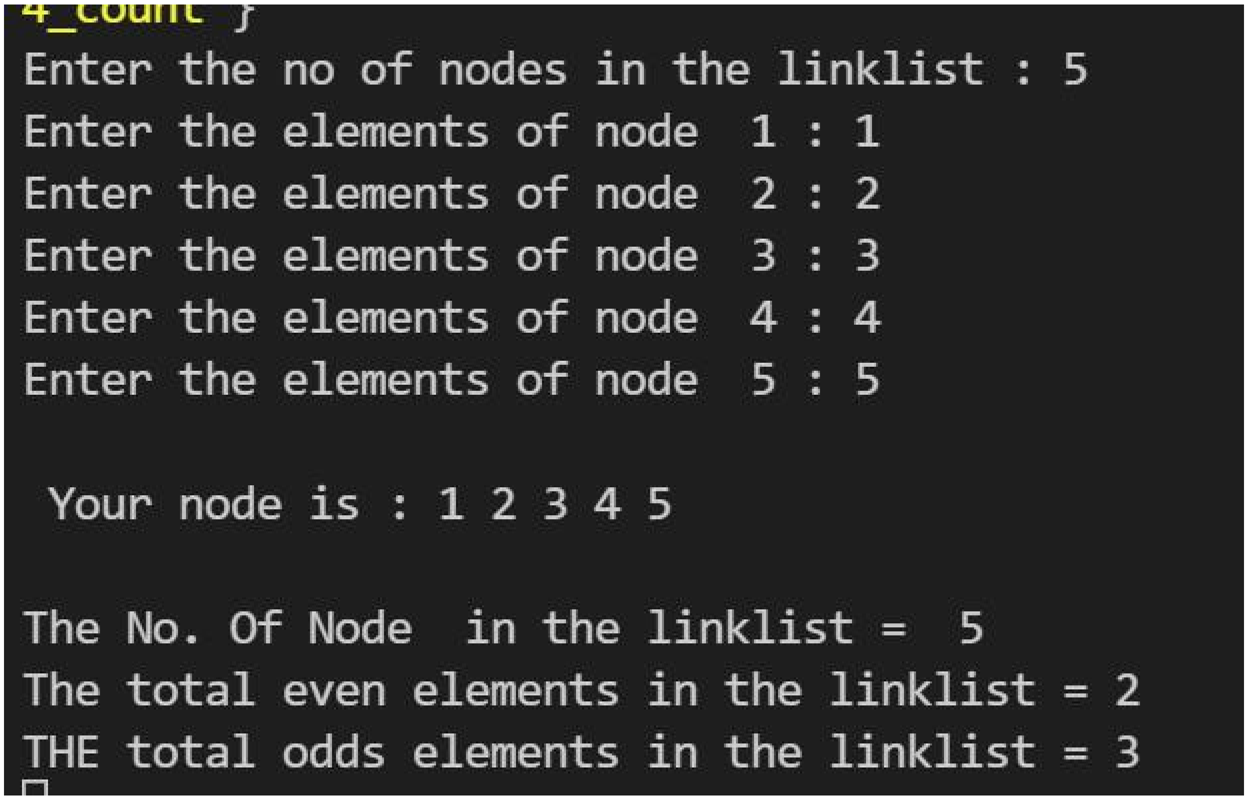
Q4

```
#include<stdio.h>
#include<conio.h>
#include<stdlib.h>
struct node
{
    int data;
    struct node *next;
}*head=NULL;
void count(struct node *h)
```



```c
{
    struct node *current,*ptr;
    int count=0,elements=0;
    for(ptr=h;ptr!=NULL;ptr=ptr->next)
    {
        count++;
        if(ptr->data%2==0)
            elements++;
    }
    printf("\n");
    printf("\nThe No. Of Node  in the linklist =  %d ",count);
    printf("\nThe total even elements in the linklist = %d ",elements);
    printf("\nTHE total odds elements in the linklist = %d ",count-elements);
}
void traverse(struct node *h)
{
    struct node *current;
    current=h;
    printf("\n Your node is : ");
    while(current!=NULL)
    {
        printf("%d ",current->data);
        current=current->next;
    }
}
void main()
{
    struct node *cur,*ptr;
    int n,i,ch,d=1;
    printf("Enter the no of nodes in the linklist : ");
    scanf("%d",&n);
    for(i=0;i<n;i++)
    {
       cur=malloc(sizeof(struct node));
       printf("Enter the elements of node  %d : ",(i+1));
       scanf("%d",&cur->data);
       cur->next=NULL;
       if(head==NULL)
       {
          head=cur;
          ptr=cur;
       }
       else
       {
           ptr->next=cur;
           ptr=cur;
       }
    }
    traverse(head);
    count(head);
    printf("\n");
   getch();
}
```

Output:-



```
 4_count }
 Enter the no of nodes in the linklist : 5
 Enter the elements of node  1 : 1
 Enter the elements of node  2 : 2
 Enter the elements of node  3 : 3
 Enter the elements of node  4 : 4
 Enter the elements of node  5 : 5

  Your node is : 1 2 3 4 5

 The No. Of Node  in the linklist =  5
 The total even elements in the linklist = 2
 THE total odds elements in the linklist = 3
```

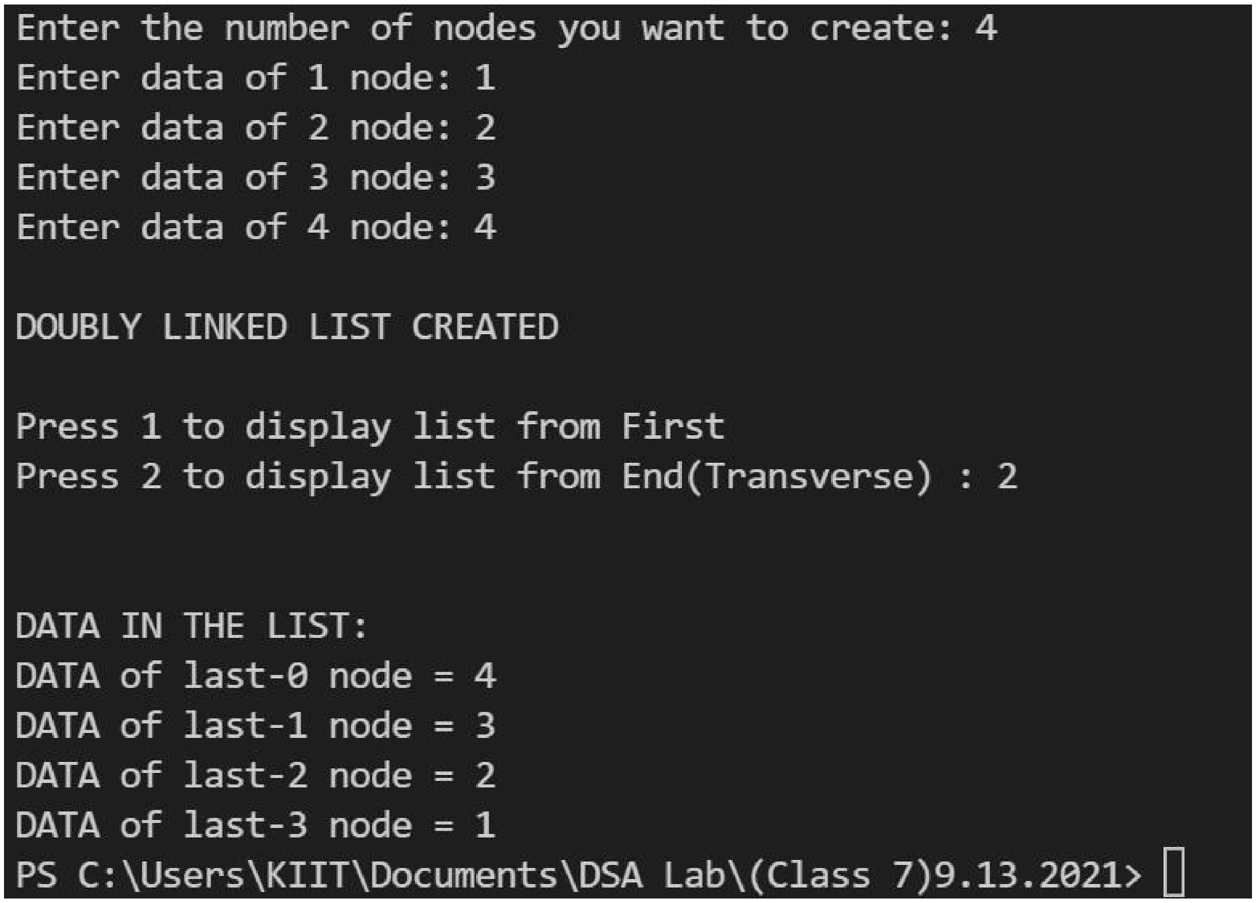
Q5 ,

```
#include <stdio.h>//By Anusthan Singh (20051337)
#include <stdlib.h>

struct node {
    int data;
```

```c
    struct node * prev;
    struct node * next;
}*head, *last;


void createList(int n);
void displayListFromStarting();
void displayListFromEnding();

int main()
{
    int n, choice;

    head = NULL;
    last = NULL;

    printf("Enter the number of nodes you want to create: ");
    scanf("%d", &n);

    createList(n);

    printf("\nPress 1 to display list from First ");
    printf("\nPress 2 to display list from End(Transverse) : ");
    scanf("%d", &choice);

    if(choice==1)
    {
        displayListFromStarting();
    }
    else if(choice == 2)
    {
        displayListFromEnding();
    }

    return 0;
}


void createList(int n)
{
    int i, data;
    struct node *newNode;

    if(n >= 1)
    {
        head = (struct node *)malloc(sizeof(struct node));

        if(head != NULL)
        {
            printf("Enter data of 1 node: ");
            scanf("%d", &data);

            head->data = data;
            head->prev = NULL;
            head->next = NULL;

            last = head;

            for(i=2; i<=n; i++)
            {
                newNode = (struct node *)malloc(sizeof(struct node));

                if(newNode != NULL)
                {
                    printf("Enter data of %d node: ", i);
                    scanf("%d", &data);

                    newNode->data = data;
                    newNode->prev = last; // Link new node to the previous node
                    newNode->next = NULL;

                    last-
>next = newNode; // vice versa Link previous node to the new node
                    last = newNode;    // now new node bcome  last/previous node
                }
                else
                {
                    printf("Unable to allocate memory.");
                    break;
                }
            }

            printf("\nDOUBLY LINKED LIST CREATED \n");
        }
        else
        {
            printf("Unable to allocate memory");
        }
    }
}
```

```
void displayListFromStarting()
{
    struct node * temp;
    int n = 1;

    if(head == NULL)
    {
        printf("List is empty.");
    }
    else
    {
        temp = head;
        printf("\n\nDATA IN THE LIST:\n");

        while(temp != NULL)
        {
            printf("DATA of %d node = %d\n", n, temp->data);

            n++;


            temp = temp-
>next;                                                     // Move the current poi
nter to next node
        }
}
}

void displayListFromEnding()
{
    struct node * temp;
    int n = 0;

    if(last == NULL)
    {
        printf("List is empty.");
    }
    else
    {
        temp = last;
        printf("\n\nDATA IN THE LIST:\n");

        while(temp != NULL)
        {
            printf("DATA of last-%d node = %d\n", n, temp->data);
            n++;

            temp = temp-
>prev;                                                      // Move the current poin
ter to previous node
        }
    }
}
```

Output.



```
Enter the number of nodes you want to create: 4
Enter data of 1 node: 1
Enter data of 2 node: 2
Enter data of 3 node: 3
Enter data of 4 node: 4

DOUBLY LINKED LIST CREATED

Press 1 to display list from First
Press 2 to display list from End(Transverse) : 2


DATA IN THE LIST:
DATA of last-0 node = 4
DATA of last-1 node = 3
DATA of last-2 node = 2
DATA of last-3 node = 1
PS C:\Users\KIIT\Documents\DSA Lab\(Class 7)9.13.2021>
```

*****************************The End***

By:- Anusthan Singh(20051337)

Date

Anusthansingh

20051337.