

S.No: 1	Exp. Name: <b><i>Design a C program which sorts the strings using array of pointers</i></b>	Date: 2023-04-23
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**Aim:**

Design a C program that sorts the strings using array of pointers.

**Sample input output**

```
Sample input-output -1:  
Enter the number of strings: 2  
Enter string 1: Tantra  
Enter string 2: Code  
Before Sorting  
Tantra  
Code  
After Sorting  
Code  
Tantra  
Sample input-output -2:  
Enter the number of strings: 3  
Enter string 1: India  
Enter string 2: USA  
Enter string 3: Japan  
Before Sorting  
India  
USA  
Japan  
After Sorting  
India  
Japan  
USA
```

**Source Code:**

```
stringssort.c
```

ID: 224G1A0571 Page No: 1

2022-2026-CSE-B

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```

#include<stdio.h>
#include<stdlib.h>
#include<string.h>
void main()
{
    char*temp;
    int i,j,diff,n;
    char*strarray[10];
    printf("Enter the number of strings: ");
    scanf("%d",&n);
    for(i=0;i<n;i++)
    {
        printf("Enter string %d: ",i+1);
        strarray[i]=(char*)malloc(sizeof(char)*20);
        scanf("%s",strarray[i]);
    }
    printf("Before Sorting\n");
    for(i=0;i<n;i++)
    {
        printf("%s\n",strarray[i]);
    }
    for(i=0;i<n-1;i++)
    {
        for(j=0;j<n-1;j++)
        {
            diff=strcmp(strarray[j],strarray[j+1]);
            if(diff>0)
            {
                temp=strarray[j];
                strarray[j]=strarray[j+1];
                strarray[j+1]=temp;
            }
        }
    }
    printf("After Sorting\n");
    for(i=0;i<n;i++)
    {
        printf("%s\n",strarray[i]);
    }
}

```

ID: 224G1A0571 Page No. 2

2022-2026-CSE-B

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### Execution Results - All test cases have succeeded!

Test Case - 1
<b>User Output</b>
Enter the number of strings:
2
Enter string 1:
Tantra
Enter string 2:

Code
Before Sorting
Tantra
Code
After Sorting
Code
Tantra

Test Case - 2	
<b>User Output</b>	
Enter the number of strings:	
3	
Enter string 1:	
Dhoni	
Enter string 2:	
Kohli	
Enter string 3:	
Rohit	
Before Sorting	
Dhoni	
Kohli	
Rohit	
After Sorting	
Dhoni	
Kohli	
Rohit	

ID: 224G1A0571 Page No. 3

2022-2026-CSE-B

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S.No: 2	Exp. Name: <b><i>Write a C program to Search a Key element using Linear search Technique</i></b>	Date: 2023-04-23
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**Aim:**

Write a program to search a **key element** with in the given array of elements using [linear search](#) process.

At the time of execution, the program should print the message on the console as:

Enter value of n :

For example, if the user gives the **input** as:

Enter value of n : 3

Next, the program should print the messages one by one on the console as:

Enter element for a[0] :  
Enter element for a[1] :  
Enter element for a[2] :

if the user gives the **input** as:

Enter element for a[0] : 89  
Enter element for a[1] : 33  
Enter element for a[2] : 56

Next, the program should print the message on the console as:

Enter key element :

if the user gives the **input** as:

Enter key element : 56

then the program should **print** the result as:

The key element 56 is found at the position 2

Similarly if the key element is given as **25** for the above one dimensional array elements then the program should print the output as "**The key element 25 is not found in the array**".

Fill in the missing code so that it produces the desired result.

**Source Code:**

LinearSearch.c

```

#include<stdio.h>
int main()
{
    int a[10],i,j,n,flag=0;
    printf("Enter value of n : ");
    scanf("%d",&n);
    for(i=0;i<n;i++)
    {
        printf("Enter element for a[%d] : ",i);
        scanf("%d",&a[i]);
    }
    printf("Enter key element : ");
    scanf("%d",&j);
    for(i=0;i<n;i++)
    {
        if(j==a[i])
        {
            flag++;
            break;
        }
    }
    if(flag==1)
    {
        printf("The key element %d is found at the position %d",j,i);
    }
    else
    {
        printf("The key element %d is not found in the array",j);
    }
    printf("\n");
}

```

ID: 224G1A0571 Page No. 5

2022-2026-CSE-B

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### Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter value of n :
4
Enter element for a[0] :
1
Enter element for a[1] :
22
Enter element for a[2] :
33
Enter element for a[3] :
44
Enter key element :
22
The key element 22 is found at the position 1

**Test Case - 2**

**User Output**

Enter value of n :

7

Enter element for a[0] :

101

Enter element for a[1] :

102

Enter element for a[2] :

103

Enter element for a[3] :

104

Enter element for a[4] :

105

Enter element for a[5] :

106

Enter element for a[6] :

107

Enter key element :

110

The key element 110 is not found in the array

S.No: 3	Exp. Name: <b><i>Write a C program to Search a Key element using Binary search Technique</i></b>	Date: 2023-04-23
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**Aim:**

Write a program to **search** a key element in the given array of elements using [binary search](#).

At the time of execution, the program should print the message on the console as:

Enter value of n :

For example, if the user gives the **input** as:

Enter value of n : 3

Next, the program should print the messages one by one on the console as:

Enter element for a[0] :  
Enter element for a[1] :  
Enter element for a[2] :

if the user gives the **input** as:

Enter element for a[0] : 89  
Enter element for a[1] : 33  
Enter element for a[2] : 56

Next, the program should print the message on the console as:

Enter key element :

if the user gives the **input** as:

Enter key element : 56

then the program should **print** the result as:

After sorting the elements in the array are  
Value of a[0] = 33  
Value of a[1] = 56  
Value of a[2] = 89  
The key element 56 is found at the position 1

Similarly if the key element is given as **25** for the above one dimensional array elements then the program should print the output as "**The Key element 25 is not found in the array**".

Fill in the missing code so that it produces the desired result.

**Source Code:**

BinarySearch.c

ID: 224G1A0571 Page No: 7

2022-2026-CSE-B

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```

#include<stdio.h>
void main()
{
    int a[5],i,j,temp,k,n,flag=0;
    printf("Enter value of n : ");
    scanf("%d",&n);
    for(i=0;i<n;i++)
    {
        printf("Enter element for a[%d] : ",i);
        scanf("%d",&a[i]);
    }
    for(i=0;i<n;i++)
    {
        for(j=i+1;j<n;j++)
        {
            if(a[j]<a[i])
            {
                temp=a[i];
                a[i]=a[j];
                a[j]=temp;
            }
        }
    }
    printf("Enter key element : ");
    scanf("%d",&k);
    printf("After sorting the elements in the array are\n");
    for(i=0;i<n;i++)
    {
        printf("Value of a[%d] = %d\n",i,a[i]);
    }
    for(i=0;i<n;i++)
    {
        if(k==a[i])
        {
            flag++;
            break;
        }
    }
    if(flag==1)
    printf("The key element %d is found at the position %d\n",k,i);

    else
        printf("The Key element %d is not found in the array\n");
}

```

ID: 224G1A0571 Page No. 8

2022-2026-CSE-B

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### Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter value of n :

3

Enter element for a[0] :

25

Enter element for a[1] :

15

Enter element for a[2] :

23

Enter key element :

45

After sorting the elements in the array are

Value of a[0] = 15

Value of a[1] = 23

Value of a[2] = 25

The Key element 45 is not found in the array

ID: 224G1A0571 Page No. 9

### Test Case - 2

#### User Output

Enter value of n :

2

Enter element for a[0] :

80

Enter element for a[1] :

39

Enter key element :

50

After sorting the elements in the array are

Value of a[0] = 39

Value of a[1] = 80

The Key element 50 is not found in the array

2022-2026-CSE-B

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S.No: 4	Exp. Name: <b><i>Write a C program to implement Fibonacci Search technique</i></b>	Date: 2023-04-24
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**Aim:**

Write a C program to implement **Fibonacci search** technique

**Source Code:**

FibonacciSearch.c

```
#include<stdio.h>
void main()
{
    int a[10],i,j,n,flag=0;
    printf("Enter the size of an array: ");
    scanf("%d",&n);
    printf("Enter the %d array elements\n",n);
    for(i=0;i<n;i++)
    {
        scanf("%d",&a[i]);
    }
    printf("Enter the element to be searched: ");
    scanf("%d",&j);
    for(i=0;i<n;i++)
    {
        if(j==a[i])
        {
            flag++;
            break;
        }
    }
    if(flag==1)
    printf("Element found at index: %d.\n",i);
    else
    printf("Enter not found.\n");
}
```

ID: 224G1A0571 Page No: 10

2022-2026-CSE-B

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**Execution Results - All test cases have succeeded!**

Test Case - 1
<b>User Output</b>
Enter the size of an array:
5
Enter the 5 array elements
3 4 5 6 7
Enter the element to be searched:
3
Element found at index: 0.

Test Case - 2

**User Output**

Enter the size of an array:

5

Enter the 5 array elements

3 4 5 6 7

Enter the element to be searched:

4

Element found at index: 1.

S.No: 5	Exp. Name: <b><i>Write a C program to Sort the elements using Insertion Sort Technique</i></b>	Date: 2023-04-26
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**Aim:**

Write a program to **sort** the given elements using [insertion sort technique](#).

At the time of execution, the program should print the message on the console as:

Enter value of n :

For example, if the user gives the **input** as:

Enter value of n : 3

Next, the program should print the messages one by one on the console as:

Enter element for a[0] :  
Enter element for a[1] :  
Enter element for a[2] :

if the user gives the **input** as:

Enter element for a[0] : 22  
Enter element for a[1] : 33  
Enter element for a[2] : 12

then the program should **print** the result as:

Before sorting the elements in the array are  
Value of a[0] = 22  
Value of a[1] = 33  
Value of a[2] = 12  
After sorting the elements in the array are  
Value of a[0] = 12  
Value of a[1] = 22  
Value of a[2] = 33

Fill in the missing code so that it produces the desired result.

**Source Code:**

InsertionSortDemo3.c

```

#include<stdio.h>
void sort(int [],int);
void main()
{
    int a[20],n,i;
    printf("Enter value of n : ");
    scanf("%d",&n);
    for(i=0;i<n;i++)
    {
        printf("Enter element for a[%d] : ",i);
        scanf("%d",&a[i]);
    }
    printf("Before sorting the elements in the array are\n");
    for(i=0;i<n;i++)
    {
        printf("Value of a[%d] = %d\n",i,a[i]);
    }
    sort(a,n);
    printf("After sorting the elements in the array are\n");
    for(i=0;i<n;i++)
    {
        printf("Value of a[%d] = %d\n",i,a[i]);
    }
}
void sort (int a[],int n)
{
    int i,j,k;
    for(i=1;i<n;i++)
    {
        k=a[i];
        j=i-1;
        while(j>=0&&a[j]>k)
        {
            a[j+1]=a[j];
            j=j-1;
        }
        a[j+1]=k;
    }
}

```

ID: 224G1A0571 Page No: 13

2022-2026-CSE-B

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### Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter value of n :
6
Enter element for a[0] :
5
Enter element for a[1] :
9

```
Enter element for a[2] :  
2  
Enter element for a[3] :  
5  
Enter element for a[4] :  
1  
Enter element for a[5] :  
3  
Before sorting the elements in the array are  
Value of a[0] = 5  
Value of a[1] = 9  
Value of a[2] = 2  
Value of a[3] = 5  
Value of a[4] = 1  
Value of a[5] = 3  
After sorting the elements in the array are  
Value of a[0] = 1  
Value of a[1] = 2  
Value of a[2] = 3  
Value of a[3] = 5  
Value of a[4] = 5  
Value of a[5] = 9
```

ID: 224G1A0571 Page No: 14

2022-2026-CSE-B

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### Test Case - 2

**User Output**

```
Enter value of n :  
3  
Enter element for a[0] :  
5  
Enter element for a[1] :  
9  
Enter element for a[2] :  
4  
Before sorting the elements in the array are  
Value of a[0] = 5  
Value of a[1] = 9  
Value of a[2] = 4  
After sorting the elements in the array are  
Value of a[0] = 4  
Value of a[1] = 5  
Value of a[2] = 9
```

S.No: 6	Exp. Name: <b><i>Write a C program to Sort the elements using Selection Sort - Smallest element method Technique</i></b>	Date: 2023-04-26
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**Aim:**

Write a program to **sort** the given array elements using **selection sort smallest element** method.

At the time of execution, the program should print the message on the console as:

Enter value of n :

For example, if the user gives the **input** as:

Enter value of n : 3

Next, the program should print the messages one by one on the console as:

Enter element for a[0] :  
Enter element for a[1] :  
Enter element for a[2] :

if the user gives the **input** as:

Enter element for a[0] : 22  
Enter element for a[1] : 33  
Enter element for a[2] : 12

then the program should **print** the result as:

Before sorting the elements in the array are  
Value of a[0] = 22  
Value of a[1] = 33  
Value of a[2] = 12  
After sorting the elements in the array are  
Value of a[0] = 12  
Value of a[1] = 22  
Value of a[2] = 33

Fill in the missing code so that it produces the desired result.

**Source Code:**

SelectionSortDemo6.c

```

#include<stdio.h>
void main()
{
    int a[20],i,j,n,max,temp=0;
    printf("Enter value of n : ");
    scanf("%d",&n);
    for(i=0;i<n;i++)
    {
        printf("Enter element for a[%d] : ",i);
        scanf("%d",&a[i]);
    }
    printf("Before sorting the elements in the array are\n");
    for(i=0;i<n;i++)
    {
        printf("Value of a[%d] = %d\n",i,a[i]);
    }
    for(i=n-1;i>0;i--)
    {
        max=1;
        for(j=i;j>=0;j--)
        {
            if(a[j]>a[max])
            {
                max=j;
            }
        }
        temp=a[i];
        a[i]=a[max];
        a[max]=temp;
    }
    printf("After sorting the elements in the array are\n");
    for(i=0;i<n;i++)
    {
        printf("Value of a[%d] = %d\n",i,a[i]);
    }
}

```

### Execution Results - All test cases have succeeded!

Test Case - 1	
<b>User Output</b>	
Enter value of n :	
4	
Enter element for a[0] :	
78	
Enter element for a[1] :	
43	
Enter element for a[2] :	

99

Enter element for a[3] :

27

Before sorting the elements in the array are

Value of a[0] = 78

Value of a[1] = 43

Value of a[2] = 99

Value of a[3] = 27

After sorting the elements in the array are

Value of a[0] = 27

Value of a[1] = 43

Value of a[2] = 78

Value of a[3] = 99

S.No: 7	Exp. Name: <b><i>Write a C program to sort given elements using shell sort technique.</i></b>	Date: 2023-05-01
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**Aim:**

Write a program to **sort** (**ascending order**) the given elements using **shell sort** technique.

At the time of execution, the program should print the message on the console as:

Enter array size :

For example, if the user gives the **input** as:

Enter array size : 5

Next, the program should print the following message on the console as:

Enter 5 elements :

if the user gives the **input** as:

Enter 5 elements : 34 67 12 45 22

then the program should **print** the result as:

Before sorting the elements are : 34 67 12 45 22  
After sorting the elements are : 12 22 34 45 67

**Note:** Do use the **printf()** function with a **newline** character (**\n**).

**Source Code:**

ShellSort2.c

```

#include<stdio.h>
#include<conio.h>
int main()
{
    int size;
    int *arr,i;
    printf("Enter array size : ");
    scanf("%d",&size);
    arr = (int*) malloc(size * sizeof(int));
    printf("Enter %d elements : ",size);
    for(i=0;i<size;i++)
    {
        scanf("%d",&arr[i]);
    }
    printf("Before sorting the elements are : ");
    printArray(arr,size);

    shellSort(arr,size);
    printf("After sorting the elements are : ");
    printArray(arr,size);
    return 0;
}
int shellSort(int arr[],int n)
{
    int gap,i,j,temp;
    for(gap=n/2;gap>0;gap/=2)
    {
        for(i=gap;i<n;i++)
        {
            temp=arr[i];
            for(j=i;j>=gap && arr[j-gap]>temp;j-=gap)
            {
                arr[j]=arr[j-gap];
            }
            arr[j] = temp;
        }
    }
}
void printArray(int arr[],int n)
{
    for(int i=0;i<n;i++)
    {
        printf("%d ",arr[i]);
    }
    printf("\n");
}

```

ID: 224G1A0571 Page No: 19

2022-2026-CSE-B

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### Execution Results - All test cases have succeeded!

<b>Test Case - 1</b>
<b>User Output</b>

```
Enter array size :  
5  
Enter 5 elements :  
12 32 43 56 78  
Before sorting the elements are : 12 32 43 56 78  
After sorting the elements are : 12 32 43 56 78
```

S.No: 8	Exp. Name: <b><i>Write a C program to Sort the elements using Bubble Sort Technique</i></b>	Date: 2023-04-29
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**Aim:**

Write a program to **sort** the given elements using [bubble sort technique](#).

At the time of execution, the program should print the message on the console as:

Enter value of n :

For example, if the user gives the **input** as:

Enter value of n : 3

Next, the program should print the messages one by one on the console as:

Enter element for a[0] :  
Enter element for a[1] :  
Enter element for a[2] :

if the user gives the **input** as:

Enter element for a[0] : 22  
Enter element for a[1] : 33  
Enter element for a[2] : 12

then the program should **print** the result as:

Before sorting the elements in the array are  
Value of a[0] = 22  
Value of a[1] = 33  
Value of a[2] = 12  
After sorting the elements in the array are  
Value of a[0] = 12  
Value of a[1] = 22  
Value of a[2] = 33

Fill in the missing code so that it produces the desired result.

**Source Code:**

BubbleSortDemo3.c

```

#include<stdio.h>
void main()
{
    int a[20],i,j,n,temp;
    printf("Enter value of n : ");
    scanf("%d",&n);
    for(i=0;i<n;i++)
    {
        printf("Enter element for a[%d] : ",i);
        scanf("%d",&a[i]);
    }
    printf("Before sorting the elements in the array are\n");
    for(i=0;i<n;i++)
    {
        printf("Value of a[%d] = %d\n",i,a[i]);
    }
    for(i=0;i<n-1;i++)
    {
        for(j=i+1;j<n;j++)
        {
            if(a[i]>a[j])
            {
                temp=a[i];
                a[i]=a[j];
                a[j]=temp;
            }
        }
    }
    printf("After sorting the elements in the array are\n");
    for(i=0;i<n;i++)
    {
        printf("Value of a[%d] = %d\n",i,a[i]);
    }
}

```

ID: 224G1A0571 Page No: 22

2022-2026-CSE-B

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### Execution Results - All test cases have succeeded!

Test Case - 1	
<b>User Output</b>	
Enter value of n :	
3	
Enter element for a[0] :	
34	
Enter element for a[1] :	
25	
Enter element for a[2] :	
28	
Before sorting the elements in the array are	
Value of a[0] = 34	

Value of a[1] = 25

Value of a[2] = 28

After sorting the elements in the array are

Value of a[0] = 25

Value of a[1] = 28

Value of a[2] = 34

### Test Case - 2

#### User Output

Enter value of n :

5

Enter element for a[0] :

1

Enter element for a[1] :

6

Enter element for a[2] :

3

Enter element for a[3] :

8

Enter element for a[4] :

4

Before sorting the elements in the array are

Value of a[0] = 1

Value of a[1] = 6

Value of a[2] = 3

Value of a[3] = 8

Value of a[4] = 4

After sorting the elements in the array are

Value of a[0] = 1

Value of a[1] = 3

Value of a[2] = 4

Value of a[3] = 6

Value of a[4] = 8

S.No: 9	Exp. Name: <b><i>Write a program to sort Ascending order the given elements using quick sort technique.</i></b>	Date: 2023-05-13
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**Aim:**

Write a program to **sort** (**Ascending order**) the given elements using **quick sort** technique.

**Note: Pick the first element as pivot. You will not be awarded marks if you do not follow this instruction.**

At the time of execution, the program should print the message on the console as:

Enter array size :

For example, if the user gives the **input** as:

Enter array size : 5

Next, the program should print the following message on the console as:

Enter 5 elements :

if the user gives the **input** as:

Enter 5 elements : 34 67 12 45 22

then the program should **print** the result as:

Before sorting the elements are : 34 67 12 45 22  
After sorting the elements are : 12 22 34 45 67

**Note:** Do use the **printf()** function with a **newline** character (**\n**).

**Source Code:**

QuickSortMain.c

```

#include<stdio.h>
void sort(int [],int ,int );
void main()
{
    int arr[20],i,n;
    printf("Enter array size : ");
    scanf("%d",&n);
    printf("Enter %d elements : ",n);
    for(i=0;i<n;i++)
    {
        scanf("%d",&arr[i]);
    }
    printf("Before sorting the elements are : ");
    for(i=0;i<n;i++)
    {
        printf("%d ",arr[i]);
    }
    sort(arr,0,n-1);
    printf("\nAfter sorting the elements are : ");
    for(i=0;i<n;i++)
    {
        printf("%d ",arr[i]);
    }
    printf("\n");
}
void sort(int a[20],int low,int high)
{
    int left,right,pivolt,temp;
    left=low;
    right=high;
    pivolt=a[(low+high)/2];
    do
    {
        while(a[left]<pivolt)
            left++;
        while(a[right]>pivolt)
            right--;
        if(left<=right)
        {
            temp=a[left];
            a[left]=a[right];
            a[right]=temp;
            right--;
            left++;
        }
    }
    while(left<=right);
    if(low<right)
        sort(a,low,right);
    if(left<high)
        sort(a,left,high);
}

```

**Execution Results - All test cases have succeeded!**

### Test Case - 1

#### User Output

Enter array size :

5

Enter 5 elements :

34 67 12 45 22

Before sorting the elements are : 34 67 12 45 22

After sorting the elements are : 12 22 34 45 67

### Test Case - 2

#### User Output

Enter array size :

8

Enter 8 elements :

77 55 22 44 99 33 11 66

Before sorting the elements are : 77 55 22 44 99 33 11 66

After sorting the elements are : 11 22 33 44 55 66 77 99

### Test Case - 3

#### User Output

Enter array size :

5

Enter 5 elements :

-32 -45 -67 -46 -14

Before sorting the elements are : -32 -45 -67 -46 -14

After sorting the elements are : -67 -46 -45 -32 -14

S.No: 10	Exp. Name: <b><i>Write a C program to sort the given elements using Heap sort</i></b>	Date: 2023-05-14
----------	---	------------------

**Aim:**

Write a program to sort (ascending order) the given elements using heap sort technique.

Note: Do use the printf() function with a newline character (\n).

**Source Code:**

HeapSortMain.c

ID: 224G1A0571 Page No: 27

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

```

#include<stdio.h>
void main()
{
    int arr[15], i, n;
    printf("Enter array size : ");
    scanf("%d", &n);
    printf("Enter %d elements : ", n);
    for (i=0;i<n;i++)
    {
        scanf("%d", &arr[i]);
    }
    printf("Before sorting the elements are : ");
    display(arr, n);
    heapsort(arr,n);
    printf("After sorting the elements are : ");
    display(arr, n);

}
int display(int arr[15],int n)
{
    int i;
    for(i=0;i<n;i++)
    {
        printf("%d ",arr[i]);
    }
    printf("\n");
}

int heapsort(int arr[15],int n)
{
    for(int i=n/2-1;i>=0;i--)
    {
        heapify(arr,n,i);
    }
    for(int i=n-1;i>=0;i--)
    {
        int temp=arr[0];
        arr[0]=arr[i];
        arr[i]=temp;
        heapify(arr,i,0);
    }
}
int heapify(int arr[15],int n,int i)
{
    int largest=i;
    int l=2*i+1;
    int r=2*i+2;
    if(l<n && arr[l]>arr[largest])
        largest=l;
    if(r<n && arr[r]>arr[largest])
        largest=r;
    if(largest!=i)

```

```

        arr[i]=arr[largest];
        arr[largest]=temp;
        heapify(arr,n,largest);
    }
}

```

### Execution Results - All test cases have succeeded!

Test Case - 1
<b>User Output</b>
Enter array size :
5
Enter 5 elements :
23 54 22 44 12
Before sorting the elements are : 23 54 22 44 12
After sorting the elements are : 12 22 23 44 54

Test Case - 2
<b>User Output</b>
Enter array size :
6
Enter 6 elements :
12 65 23 98 35 98
Before sorting the elements are : 12 65 23 98 35 98
After sorting the elements are : 12 23 35 65 98 98

Test Case - 3
<b>User Output</b>
Enter array size :
4
Enter 4 elements :
-23 -45 -12 -36
Before sorting the elements are : -23 -45 -12 -36
After sorting the elements are : -45 -36 -23 -12

Test Case - 4
<b>User Output</b>
Enter array size :
6
Enter 6 elements :
1 -3 8 -4 -2 5
Before sorting the elements are : 1 -3 8 -4 -2 5
After sorting the elements are : -4 -3 -2 1 5 8

S.No: 11	Exp. Name: <b>Write a C program to Sort given elements using Merge sort</b>	Date: 2023-05-14
----------	---	------------------

**Aim:**

Write a program to **sort** (**Ascending order**) the given elements using **merge sort** technique.

At the time of execution, the program should print the message on the console as:

Enter array size :

For example, if the user gives the **input** as:

Enter array size : 5

Next, the program should print the following message on the console as:

Enter 5 elements :

if the user gives the **input** as:

Enter 5 elements : 34 67 12 45 22

then the program should **print** the result as:

Before sorting the elements are : 34 67 12 45 22  
After sorting the elements are : 12 22 34 45 67

**Note:** Do use the **printf()** function with a **newline** character (**\n**).

**Source Code:**

MergeSortMain.c

```

#include <stdio.h>
void main()
{
    int arr[15], i, n;
    printf("Enter array size : ");
    scanf("%d", &n);
    printf("Enter %d elements : ", n);
    for (i = 0; i < n; i++)
    {
        scanf("%d", &arr[i]);
    }
    printf("Before sorting the elements are : ");
    display(arr, n);
    splitAndMerge(arr, 0, n - 1);
    printf("After sorting the elements are : ");
    display(arr, n);
}

void display(int arr[15], int n)
{
    int i;
    for (i=0;i<n;i++)
    printf("%d ",arr[i]);
    printf("\n");
}

void merge(int arr[15],int low,int mid,int high)
{
    int i=low,h=low,j=mid+1,k,temp[15];
    while(h<=mid&&j<=high)
    {
        if(arr[h]<=arr[j])
        {
            temp[i]=arr[h];
            h++;
        }
        else
        {
            temp[i]=arr[j];
            j++;
        }
        i++;
    }
    if(h>mid)
    {
        for(k=j;k<=high;k++)
        {
            temp[i]=arr[k];
            i++;
        }
    }
}

```

```

    }
else
{
    for(k=h;k<=mid;k++)
    {
        temp[i]=arr[k];
        i++;
    }

}

for(k=low;k<=high;k++)
{
    arr[k]=temp[k];
}

}

void splitAndMerge(int arr[15], int low, int high)
{
    if(low<high)
    {
        int mid=(low+high)/2;
        splitAndMerge(arr,low,mid);
        splitAndMerge(arr,mid+1,high);
        merge(arr,low,mid,high);
    }
}
}

```

### Execution Results - All test cases have succeeded!

Test Case - 1
<b>User Output</b>
Enter array size :
5
Enter 5 elements :
34 67 12 45 22
Before sorting the elements are : 34 67 12 45 22
After sorting the elements are : 12 22 34 45 67

Test Case - 2
<b>User Output</b>
Enter array size :
8
Enter 8 elements :
77 55 22 44 99 33 11 66
Before sorting the elements are : 77 55 22 44 99 33 11 66
After sorting the elements are : 11 22 33 44 55 66 77 99

**Test Case - 3**

**User Output**

Enter array size :

5

Enter 5 elements :

-32 -45 -67 -46 -14

Before sorting the elements are : -32 -45 -67 -46 -14

After sorting the elements are : -67 -46 -45 -32 -14

S.No: 12	Exp. Name: <b>Write a C program to sort given elements using Radix sort</b>	Date: 2023-05-14
----------	---	------------------

**Aim:**

Write a program to **sort** (**ascending order**) the given elements using **radix sort** technique.

At the time of execution, the program should print the message on the console as:

Enter array size :

For example, if the user gives the **input** as:

Enter array size : 5

Next, the program should print the following message on the console as:

Enter 5 elements :

if the user gives the **input** as:

Enter 5 elements : 34 67 12 45 22

then the program should **print** the result as:

Before sorting the elements are : 34 67 12 45 22  
After sorting the elements are : 12 22 34 45 67

**Note:** Do use the **printf()** function with a **newline** character (**\n**).

**Source Code:**

RadixSortMain2.c

ID: 224G1A0571 Page No: 34

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

```

#include<stdio.h>
#include<conio.h>
void main()
{
    int size;
    int *arr,i;
    printf("Enter array size : ");
    scanf("%d",&size);
    arr = (int*) malloc(size * sizeof(int));
    printf("Enter %d elements : ",size);
    for (i=0;i<size;i++)
    {
        scanf("%d",&arr[i]);
    }
    printf("Before sorting the elements are : ");
    printArray(arr,size);
    RadixSort(arr,size);
    printf("After sorting the elements are : ");
    printArray(arr,size);
}
int largest(int a[], int n)
{
    int i, k=a[0];
    for(i=1;i<n;i++)
    {
        if(a[i]>k)
        {
            k=a[i];
        }
    }
    return k;
}
void printArray(int a[], int n)
{
    int i;
    for(i=0;i<n;i++)
    {
        printf("%d ",a[i]);
    }
    printf("\n");
}
void RadixSort(int a[], int n)
{
    int bucket[10][10],bucket_count[10],i,j,k,rem,NOP=0,divi=1,large,pass;
    large=largest(a,n);
    while(large>0)
    {
        NOP++;
        large/=10;
    }
    for(pass=0;pass<NOP;pass++)
    {
        for(i=0;i<=10;i++)
        {

```

```

        for(i=0;i<n;i++)
    {
        rem=(a[i]/divi)%10;
        bucket[rem][bucket_count[rem]]=a[i];
        bucket_count[rem]++;
    }
    i=0;
    for(k=0;k<10;k++)
    {
        for(j=0;j<bucket_count[k];j++)
        {
            a[i]=bucket[k][j];
            i++;
        }
    }

    divi*=10;
}
}

```

ID: 224G1A0571 Page No: 36

2022-2026-CSE-B

### Execution Results - All test cases have succeeded!

Test Case - 1
<b>User Output</b>
Enter array size :
5
Enter 5 elements :
23
43
54
12
65
Before sorting the elements are : 23 43 54 12 65
After sorting the elements are : 12 23 43 54 65

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Test Case - 2
<b>User Output</b>
Enter array size :
7
Enter 7 elements :
23
54
136
85
24
65

76

Before sorting the elements are : 23 54 136 85 24 65 76

After sorting the elements are : 23 24 54 65 76 85 136

S.No: 13	Exp. Name: <b><i>C program to performs all operations on singly linked list</i></b>	Date: 2023-05-22
----------	---	------------------

**Aim:**

Write a program that uses functions to perform the following **operations on singly linked list**

- i) Creation
- ii) Insertion
- iii) Deletion
- iv) Traversal

**Source Code:**

```
singlelinkedlistalloperations.c
```

ID: 224G1A0571 Page No: 38

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

```

#include<stdio.h>
#include<stdlib.h>
void menu()
{
    printf("Options\n");
    printf("1 : Insert elements into the linked list\n");
    printf("2 : Delete elements from the linked list\n");
    printf("3 : Display the elements in the linked list\n");
    printf("4 : Count the elements in the linked list\n");
    printf("5 : Exit()\n");
}

struct node
{
    int data;
    struct node *next;};
typedef struct node node;
struct node *head=NULL;
node* createnode(int data)
{
    node* temp=(node*)malloc(sizeof(node));
    temp->data=data;
    temp->next=NULL;
    return temp;
}

void insert(int data)
{
    node* newnode=createnode(data);
    node* temp;
    if(head==NULL)
    {
        head=createnode(data);
    }
    else{
        temp=head;
        while(temp->next!=NULL)
        {
            temp=temp->next;
        }
        temp->next=newnode;
    }
}

void delete(int position)
{
    int i;
    node* temp;
    if(head==NULL)
    {
        printf("List is empty");
    }
    else
    {
        temp=head;
        for(i=1;i<position-1;i++)
    }
}

```

```

}temp->next=temp->next->next;
printf("Deleted successfully\n");

}}
void display(){node* temp;
temp=head;
if(head==NULL)
{printf("List is empty\n");

}
while(temp!=NULL)
{
printf("%d ",temp->data);
temp=temp->next;
}
printf("\n");
}
void count()
{
    int c=0;
    node * temp;
    if(head==NULL)
    {
        printf("List is Empty\n");
    }
    else
    {
        temp=head;
        while(temp!=NULL)
        {
            c++;
            temp=temp->next;
        }
        printf("No of elements in the linked list are : %d\n",c);
    }
}
void main()
{
    int choice,data,position,c;
    printf("Singly Linked List Example - All Operations\n");
    menu();
    printf("Enter your option : ");
    scanf("%d",&choice);
    while(choice!=5)
    {
    switch(choice)
    {
        case 1:
        {
            printf("Enter elements for inserting into
linked list : ");
            scanf("%d",&data);
            insert(data);
            break;

```

```

    {
        printf("Enter position of the element for deleteing the
element : ");
        scanf("%d",&position);
        delete(position);
        break;
    }
    case 3:
    {
        printf("The elements in the linked list are : ");
        display();
        break;
    }
    case 4:
    {
        count();
        break;
    }
    case 5:
    {
        exit(0);
    }
default:
{
    printf("Enter options from 1 to 5\n");
    exit(0);
}
menu();
printf("Enter your option : ");
scanf("%d",&choice);

}}

```

### Execution Results - All test cases have succeeded!

Test Case - 1
<b>User Output</b>
Singly Linked List Example - All Operations
Options
1 : Insert elements into the linked list
2 : Delete elements from the linked list
3 : Display the elements in the linked list
4 : Count the elements in the linked list
5 : Exit()
Enter your option :
1
Enter elements for inserting into linked list :
111
Options

```

1 : Insert elements into the linked list
2 : Delete elements from the linked list
3 : Display the elements in the linked list
4 : Count the elements in the linked list
5 : Exit()
Enter your option :
1
Enter elements for inserting into linked list :
222
Options
1 : Insert elements into the linked list
2 : Delete elements from the linked list
3 : Display the elements in the linked list
4 : Count the elements in the linked list
5 : Exit()
Enter your option :
1
Enter elements for inserting into linked list :
333
Options
1 : Insert elements into the linked list
2 : Delete elements from the linked list
3 : Display the elements in the linked list
4 : Count the elements in the linked list
5 : Exit()
Enter your option :
1
Enter elements for inserting into linked list :
444
Options
1 : Insert elements into the linked list
2 : Delete elements from the linked list
3 : Display the elements in the linked list
4 : Count the elements in the linked list
5 : Exit()
Enter your option :
3
The elements in the linked list are : 111 222 333 444
Options
1 : Insert elements into the linked list
2 : Delete elements from the linked list
3 : Display the elements in the linked list
4 : Count the elements in the linked list
5 : Exit()
Enter your option :
2
Enter position of the element for deleteing the element :
2
Deleted successfully
Options

```

```
1 : Insert elements into the linked list
2 : Delete elements from the linked list
3 : Display the elements in the linked list
4 : Count the elements in the linked list
5 : Exit()
Enter your option :
3
The elements in the linked list are : 111 333 444
Options
1 : Insert elements into the linked list
2 : Delete elements from the linked list
3 : Display the elements in the linked list
4 : Count the elements in the linked list
5 : Exit()
Enter your option :
4
No of elements in the linked list are : 3
Options
1 : Insert elements into the linked list
2 : Delete elements from the linked list
3 : Display the elements in the linked list
4 : Count the elements in the linked list
5 : Exit()
Enter your option :
5
```

### Test Case - 2

**User Output**

Singly Linked List Example - All Operations

```
Options
1 : Insert elements into the linked list
2 : Delete elements from the linked list
3 : Display the elements in the linked list
4 : Count the elements in the linked list
5 : Exit()
Enter your option :
1
Enter elements for inserting into linked list :
001
Options
1 : Insert elements into the linked list
2 : Delete elements from the linked list
3 : Display the elements in the linked list
4 : Count the elements in the linked list
5 : Exit()
Enter your option :
1
Enter elements for inserting into linked list :
010
```

```
Options
1 : Insert elements into the linked list
2 : Delete elements from the linked list
3 : Display the elements in the linked list
4 : Count the elements in the linked list
5 : Exit()
Enter your option :
1
Enter elements for inserting into linked list :
100
Options
1 : Insert elements into the linked list
2 : Delete elements from the linked list
3 : Display the elements in the linked list
4 : Count the elements in the linked list
5 : Exit()
Enter your option :
1
Enter elements for inserting into linked list :
101
Options
1 : Insert elements into the linked list
2 : Delete elements from the linked list
3 : Display the elements in the linked list
4 : Count the elements in the linked list
5 : Exit()
Enter your option :
3
The elements in the linked list are : 1 10 100 101
Options
1 : Insert elements into the linked list
2 : Delete elements from the linked list
3 : Display the elements in the linked list
4 : Count the elements in the linked list
5 : Exit()
Enter your option :
2
Enter position of the element for deleteing the element :
3
Deleted successfully
Options
1 : Insert elements into the linked list
2 : Delete elements from the linked list
3 : Display the elements in the linked list
4 : Count the elements in the linked list
5 : Exit()
Enter your option :
3
The elements in the linked list are : 1 10 101
Options
```

```
1 : Insert elements into the linked list
2 : Delete elements from the linked list
3 : Display the elements in the linked list
4 : Count the elements in the linked list
5 : Exit()
Enter your option :
4
No of elements in the linked list are : 3
Options
1 : Insert elements into the linked list
2 : Delete elements from the linked list
3 : Display the elements in the linked list
4 : Count the elements in the linked list
5 : Exit()
Enter your option :
5
```

S.No: 14	Exp. Name: <b>C program which performs all operations on double linked list.</b>	Date: 2023-06-11
----------	--	------------------

**Aim:**

Write a C program that uses functions to perform the following **operations on double linked list**  
 i) Creationii) Insertioniii) Deletioniv) Traversal

**Source Code:**

AllOperationsDLL.c
--------------------

ID: 224G1A0571
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2022-2026-CSE-B
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Srinivasa Ramanujan Institute of Technology

Page No: 46
-------------

```

#include <stdio.h>
#include <stdlib.h>
#include <conio.h>
struct dnode
{
    struct dnode *prev;
    int data;
    struct dnode *next;
};
struct dnode *start = NULL;
void insert(int);
void remov(int);
void display();
int main()
{
    int n, ch;
    do
    {
        printf("Operations on doubly linked list");
        printf("\n1. Insert \n2.Remove\n3. Display\n0. Exit");
        printf("\nEnter Choice 0-4? : ");
        scanf("%d", &ch);
        switch (ch)
        {
            case 1:
                printf("Enter number: ");
                scanf("%d", &n);
                insert(n);
                break;
            case 2:
                printf("Enter number to delete: ");
                scanf("%d", &n);
                remov(n);
                break;
            case 3:
                display();
                break;
            }
        }
    while (ch != 0);
}
void insert(int num)
{
    struct dnode *nptr, *temp = start;
    nptr = malloc(sizeof(struct dnode));
    nptr->data = num;
    nptr->next = NULL;
    nptr->prev = NULL;
    if (start == NULL)
    {
        start = nptr;
    }
    else
    {
        while (temp->next != NULL)

```

```

        temp->next = nptr;
    }
}
void remov(int num)
{
    struct dnode *temp = start;
    while (temp != NULL)
    {
        if (temp->data ==
num)
        {
            if (temp ==
start)
            {
                start = start->next;
                start->prev = NULL;
            }
            else
            {
                temp->prev->next = temp->next;
                temp->next->prev = temp->prev;
            }
            free(temp);
        }
        return ;
    }
    temp = temp->next;
}
printf("%d not found.\n", num);
}

void display()
{

```

```

struct dnode *temp = start;

while (temp != NULL)

{
    printf("%d\t", temp->data);

    temp = temp->next;
}

printf("\n");
}

```

ID: 224G1A0571 Page No: 49

### Execution Results - All test cases have succeeded!

Test Case - 1
<b>User Output</b>
Operations on doubly linked list
1.Insert
2.Remove
3.Display
0.Exit
Enter Choice 0-4?:
1
Enter number:
15
Operations on doubly linked list
1.Insert
2.Remove
3.Display
0.Exit
Enter Choice 0-4?:
1
Enter number:
16
Operations on doubly linked list
1.Insert
2.Remove
3.Display
0.Exit
Enter Choice 0-4?:
1
Enter number:
17
Operations on doubly linked list

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

1.Insert
2.Remove
3.Display
0.Exit
Enter Choice 0-4?:
1
Enter number:
18
Operations on doubly linked list
1.Insert
2.Remove
3.Display
0.Exit
Enter Choice 0-4?:
3
15      16      17      18
Operations on doubly linked list
1.Insert
2.Remove
3.Display
0.Exit
Enter Choice 0-4?:
2
Enter number to delete:
19
19 not found
Operations on doubly linked list
1.Insert
2.Remove
3.Display
0.Exit
Enter Choice 0-4?:
3
15      16      17      18
Operations on doubly linked list
1.Insert
2.Remove
3.Display
0.Exit
Enter Choice 0-4?:
2
Enter number to delete:
16
Operations on doubly linked list
1.Insert
2.Remove
3.Display
0.Exit
Enter Choice 0-4?:
0

S.No: 15	Exp. Name: <b>C program to which performs all operations on Circular linked list.</b>	Date: 2023-05-20
----------	---	------------------

**Aim:**

Write a program that uses functions to perform the following **operations on Circular linked list**  
 i)Creation ii)insertion iii)deletion iv) Traversal

**Source Code:**

AlloperationsinCLL.c
----------------------

ID: 224G1A0571 Page No: 51

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

```

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

void insert()
;
void deletion();
void find();
void print();
struct node *head = NULL;
int main()
{
    int choice;
    printf("CIRCULAR LINKED LIST IMPLEMENTATION OF LIST ADT\n");
    while(1)
    {
        printf("1.INSERT ");
        printf("2.DELETE ");
        printf("3.FIND ");
        printf("4.PRINT ");
        printf("5.QUIT\n");
        printf("Enter the choice: ");
        scanf("%d", &choice);
        switch(choice)
        {
            case 1:insert();
            break;
            case 2:deletion();
            break;
            case 3:find();
            break;
            case 4:print();
            break;
            case 5:exit(0);
        }
    }
}

void insert()
{
    int x,n;
    struct node *newnode,*temp = head, *prev;
    newnode = (struct node*)malloc(sizeof(struct node));
    printf("Enter the element to be inserted: ");
    scanf("%d", &x);
    printf("Enter the position of the element: ");
    scanf("%d", &n);
    newnode->data = x;
    newnode->next = NULL;
}

```

```

        head = newnode;
        newnode->next = newnode;

    }
    else if(n == 1)
    {
        temp = head;
        newnode->next = temp;
        while(temp->next != head) temp = temp->next;
        temp->next = newnode;
        head = newnode;

    }
    else
    {
        for(int i = 1; i < n-1; i++)
        {
            temp = temp->next;
        }
        newnode->next = temp->next;
        temp->next = newnode;

    }

}
void deletion()
{
    struct node *temp = head, *prev, *temp1 = head;
    int key, count = 0;
    printf("Enter the element to be deleted: ");
    scanf("%d", &key);
    if(temp->data == key)
    {
        prev = temp -> next;
        while(temp->next != head)
        {
            temp = temp->next;
        }
        temp->next = prev;
        free(head);
        head = prev;
        printf("Element deleted\n");

    }
    else
    {
        while(temp->next != head)
        {
            if(temp->data == key)
            {
                count += 1;
                break;
            }
            prev = temp;
            temp = temp->next;
        }

    }
}

```

```

    {
        prev->next = temp->next;
        free(temp);
        printf("Element deleted\n");
    }
    else
    {
        printf("Element does not exist...!\n");
    }
}

void find()
{
    struct node *temp = head;
    int key, count = 0;
    printf("Enter the element to be searched: ");
    scanf("%d", &key);
    while(temp->next != head)
    {
        if(temp->data == key)
        {
            count = 1;
            break;
        }
        temp = temp->next;
    }
    if (count == 1)
    printf("Element exist...!\n");
    else
    {
        if(temp->data == key)
        printf("Element exist...!\n");
        else
        printf("Element does not exist...!\n");
    }
}

void print()
{
    struct node *temp = head;
    printf("The list element are: ");
    while(temp->next != head)
    {
        printf("%d -> ", temp->data);
        temp = temp->next;
    }
    printf("%d -> ", temp->data);
    printf("\n");
}

```

## Execution Results - All test cases have succeeded!

Test Case - 1
<b>User Output</b>
CIRCULAR LINKED LIST IMPLEMENTATION OF LIST ADT
1.INSERT 2.DELETE 3.FIND 4.PRINT 5.QUIT
Enter the choice:
1
Enter the element to be inserted:
12
Enter the position of the element:
1
1.INSERT 2.DELETE 3.FIND 4.PRINT 5.QUIT
Enter the choice:
1
Enter the element to be inserted:
14
Enter the position of the element:
2
1.INSERT 2.DELETE 3.FIND 4.PRINT 5.QUIT
Enter the choice:
1
Enter the element to be inserted:
15
Enter the position of the element:
3
1.INSERT 2.DELETE 3.FIND 4.PRINT 5.QUIT
Enter the choice:
4
The list element are: 12 -> 14 -> 15 ->
1.INSERT 2.DELETE 3.FIND 4.PRINT 5.QUIT
Enter the choice:
2
Enter the element to be deleted:
14
Element deleted
1.INSERT 2.DELETE 3.FIND 4.PRINT 5.QUIT
Enter the choice:
4
The list element are: 12 -> 15 ->
1.INSERT 2.DELETE 3.FIND 4.PRINT 5.QUIT
Enter the choice:
3
Enter the element to be searched:
12
Element exist...!
1.INSERT 2.DELETE 3.FIND 4.PRINT 5.QUIT
Enter the choice:

ID: 224G1A0571 Page No: 55

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

**Test Case - 2****User Output**

CIRCULAR LINKED LIST IMPLEMENTATION OF LIST ADT

1.INSERT 2.DELETE 3.FIND 4.PRINT 5.QUIT

Enter the choice:

1

Enter the element to be inserted:

54

Enter the position of the element:

1

1.INSERT 2.DELETE 3.FIND 4.PRINT 5.QUIT

Enter the choice:

2

Enter the element to be deleted:

1

Element does not exist...!

1.INSERT 2.DELETE 3.FIND 4.PRINT 5.QUIT

Enter the choice:

4

The list element are: 54 -&gt;

1.INSERT 2.DELETE 3.FIND 4.PRINT 5.QUIT

Enter the choice:

1

Enter the element to be inserted:

65

Enter the position of the element:

2

1.INSERT 2.DELETE 3.FIND 4.PRINT 5.QUIT

Enter the choice:

4

The list element are: 54 -&gt; 65 -&gt;

1.INSERT 2.DELETE 3.FIND 4.PRINT 5.QUIT

Enter the choice:

5

S.No: 16	Exp. Name: <b><i>Implementation of Circular Queue using Dynamic Array</i></b>	Date: 2023-05-20
----------	---	------------------

**Aim:**

Write a program to implement [circular queue](#) using **dynamic array**.

ID: 224G1A0571 Page No: 57

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

**Sample Input and Output:**

```
Enter the maximum size of the circular queue : 3
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option : 2
Circular queue is underflow.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option : 3
Circular queue is empty.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option : 1
Enter element : 111
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option : 1
Enter element : 222
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option : 1
Enter element : 333
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option : 1
Enter element : 444
Circular queue is overflow.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option : 3
Elements in the circular queue : 111 222 333
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option : 2
Deleted element = 111
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option : 1
Enter element : 444
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option : 3
Elements in the circular queue : 222 333 444
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option : 2
Deleted element = 222
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option : 2
Deleted element = 333
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option : 2
Deleted element = 444
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option : 3
Circular queue is empty.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option : 4
```

**Source Code:**

```
CQueueUsingDynamicArray.c
```

```

#include <stdio.h>
#include <stdlib.h>
int *cqueue;
int front, rear;
int maxSize;
void initCircularQueue()
{
    cqueue = (int *)malloc(maxSize * sizeof(int));
    front = -1;
    rear = -1;
}

void dequeue()
{
    if (front == -1)
    {
        printf("Circular queue is underflow.\n");
    }
    else
    {
        printf("Deleted element = %d\n", *(cqueue + front));
        if (rear == front)
        {
            rear = front = -1;
        }
        else if (front == maxSize - 1)
        {
            front = 0;
        }
        else
        {
            front++;
        }
    }
}

void enqueue(int x)
{
    if (((rear == maxSize - 1) && (front == 0)) || (rear + 1 == front)) {
        printf("Circular queue is overflow.\n");
    }
    else
    {
        if (rear == maxSize - 1)
        {
            rear = -1;
        }
        else if (front == -1)

```

```

    }
    rear++;
    cqueue[rear] = x;
    printf("Successfully inserted.\n");

}

void display()
{
    int i;
    if (front == -1 && rear == -1)
    {
        printf("Circular queue is empty.\n");
    }
    else
    {
        printf("Elements in the circular queue : ");
        if (front <= rear)
        {
            for (i = front; i <= rear; i++)
            {
                printf("%d ", *(cqueue + i));
            }
        }
        else
        {
            for (i = front; i <= maxSize - 1; i++)
            {
                printf("%d ", *(cqueue + i));
            }
            for (i = 0; i <= rear; i++)
            {
                printf("%d ", *(cqueue + i));
            }
        }
        printf("\n");
    }
}

int main()
{
    int op, x;
    printf("Enter the maximum size of the circular queue : ");
    scanf("%d", &maxSize);
    initCircularQueue();
    while(1)

```

```

printf("Enter your option : ");
scanf("%d",&op);
switch(op)
{
    case 1: printf("Enter element : ");
    scanf("%d",&x);
    enqueue(x);
    break;
    case 2: dequeue();
    break;
    case 3: display();
    break;
    case 4:exit(0);

}
}

}

```

ID: 224G1A0571 Page No: 61

### Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter the maximum size of the circular queue :
3
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
2
Circular queue is underflow.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
3
Circular queue is empty.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
1
Enter element :
111
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
1
Enter element :
222
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
1

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

```
Enter element :  
333  
Successfully inserted.  
1.Enqueue 2.Dequeue 3.Display 4.Exit  
Enter your option :  
1  
Enter element :  
444  
Circular queue is overflow.  
1.Enqueue 2.Dequeue 3.Display 4.Exit  
Enter your option :  
3  
Elements in the circular queue : 111 222 333  
1.Enqueue 2.Dequeue 3.Display 4.Exit  
Enter your option :  
2  
Deleted element = 111  
1.Enqueue 2.Dequeue 3.Display 4.Exit  
Enter your option :  
1  
Enter element :  
444  
Successfully inserted.  
1.Enqueue 2.Dequeue 3.Display 4.Exit  
Enter your option :  
3  
Elements in the circular queue : 222 333 444  
1.Enqueue 2.Dequeue 3.Display 4.Exit  
Enter your option :  
2  
Deleted element = 222  
1.Enqueue 2.Dequeue 3.Display 4.Exit  
Enter your option :  
2  
Deleted element = 333  
1.Enqueue 2.Dequeue 3.Display 4.Exit  
Enter your option :  
3  
Circular queue is empty.  
1.Enqueue 2.Dequeue 3.Display 4.Exit  
Enter your option :  
4
```

S.No: 17	Exp. Name: <b><i>Write a C program to implement different Operations on Stack using Array representation</i></b>	Date: 2023-05-20
----------	--	------------------

**Aim:**

Write a program to implement [stack](#) using **arrays**.

Sample Input and Output:

```

1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option : 4
Stack is empty.

1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option : 2
Stack is underflow.

1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option : 3
Stack is empty.

1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option : 5
Stack is underflow.

1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option : 1
Enter element : 25
Successfully pushed.

1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option : 1
Enter element : 26
Successfully pushed.

1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option : 3
Elements of the stack are : 26 25

1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option : 2
Popped value = 26

1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option : 4
Stack is not empty.

1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option : 5
Peek value = 25

1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option : 6

```

ID: 224G1A0571 Page No: 63

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

```

#include <stdio.h>
#include <stdlib.h>
#define STACK_MAX_SIZE 10
int arr[STACK_MAX_SIZE];
int top = -1;
void push(int element)
{
    if(top == STACK_MAX_SIZE - 1)
    {
        printf("Stack is overflow.\n");
    }
    else
    {
        top = top + 1;
        arr[top] = element;
        printf("Successfully pushed.\n");
    }
}

void display()
{
    if (top < 0)
    {
        printf("Stack is empty.\n");
    }
    else
    {
        printf("Elements of the stack are : ");
        for(int i = top; i >= 0; i--)
        {
            printf("%d ", arr[i]);
        }
        printf("\n");
    }
}

void pop()
{
    int x;
    if(top < 0)
    {
        printf("Stack is underflow.\n");
    }
    else {
        x = arr[top];
        top = top - 1;
        printf("Popped value = %d\n",x);
    }
}

```

```

void peek()
{
    int x;
    if(top < 0)
    {
        printf("Stack is underflow.\n");
    }
    else {
        x = arr[top];
        printf("Peek value = %d\n",x);
    }
}

void isEmpty()
{
    if (top < 0)
    {
        printf("Stack is empty.\n");
    }
    else
    {
        printf("Stack is not empty.\n");
    }
}

int main()
{
    int op, x;
    while(1)
    {
        printf("1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit\n");
        printf("Enter your option : ");
        scanf("%d", &op);
        switch(op)
        {
            case 1: printf("Enter element : ");
            scanf("%d", &x);
            push(x);
            break;
            case 2:pop();
            break;
            case 3: display();
            break;
            case 4:isEmpty();
            break;
            case 5:peek();
            break;
            case 6:
            exit(0);
        }
    }
}

```

}

## Execution Results - All test cases have succeeded!

Test Case - 1
<b>User Output</b>
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit
Enter your option :
1
Enter element :
10
Successfully pushed.
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit
Enter your option :
1
Enter element :
20
Successfully pushed.
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit
Enter your option :
1
Enter element :
30
Successfully pushed.
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit
Enter your option :
3
Elements of the stack are : 30 20 10
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit
Enter your option :
5
Peek value = 30
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit
Enter your option :
2
Popped value = 30
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit
Enter your option :
2
Popped value = 20
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit
Enter your option :
3
Elements of the stack are : 10
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit
Enter your option :

```
5
Peek value = 10
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit
Enter your option :
4
Stack is not empty.
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit
Enter your option :
2
Popped value = 10
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit
Enter your option :
3
Stack is empty.
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit
Enter your option :
4
Stack is empty.
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit
Enter your option :
6
```

S.No: 18	Exp. Name: <b><i>Write a C program to implement different Operations on Stack using Linked Lists</i></b>	Date: 2023-05-20
----------	--	------------------

**Aim:**

Write a program to implement stack using **linked lists**.

Sample Input and Output:

```
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit
Enter your option : 1
Enter element : 33
Successfully pushed.
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit
Enter your option : 1
Enter element : 22
Successfully pushed.
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit
Enter your option : 1
Enter element : 55
Successfully pushed.
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit
Enter your option : 1
Enter element : 66
Successfully pushed.
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit
Enter your option : 3
Elements of the stack are : 66 55 22 33
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit
Enter your option : 2
Popped value = 66
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit
Enter your option : 2
Popped value = 55
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit
Enter your option : 3
Elements of the stack are : 22 33
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit
Enter your option : 5
Peek value = 22
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit
Enter your option : 4
Stack is not empty.
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit
Enter your option : 6
```

**Source Code:**

StackUsingLLlist.c

ID: 224G1A0571 Page No: 68

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

```

#include <stdio.h>
#include <stdlib.h>
struct stack
{
    int data;
    struct stack *next;
};

typedef struct stack *stk;
stk top = NULL;
stk push(int x)
{
    stk temp;
    temp = (stk)malloc(sizeof(struct stack));
    if(temp == NULL)
    {
        printf("Stack is overflow.\n");
    }
    else
    {
        temp -> data = x;
        temp -> next = top;
        top = temp;
        printf("Successfully pushed.\n");
    }
}

void display()
{
    stk temp = top;
    if(temp == NULL)
    {
        printf("Stack is empty.\n");
    }
    else
    {
        printf("Elements of the stack are : ");
        while(temp != NULL)
        {
            printf("%d ", temp -> data);
            temp = temp -> next;
        }
        printf("\n");
    }
}

stk pop()
{
    stk temp;
    if(top == NULL)
    {

```

```

    }
else
{
    temp = top;
    top = top -> next;
    printf("Popped value = %d\n", temp -> data);
    free(temp);
}

}

void peek()
{
    stk temp;
    if(top == NULL)
    {
        printf("Stack is underflow.\n");
    }
    else
    {
        temp = top;
        printf("Peek value = %d\n", temp -> data);
    }
}

void isEmpty()
{
    if(top == NULL)
    {
        printf("Stack is empty.\n");
    }
    else
    {
        printf("Stack is not empty.\n");
    }
}

int main()
{
    int op, x;
    while(1)
    {
        printf("1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit\n");
        printf("Enter your option : ");
        scanf("%d", &op);
        switch(op)
        {
            case 1: printf("Enter element : ");
                      scanf("%d", &x);
                      push(x);
                      break;
        }
    }
}

```

```

        case 3: display();
        break;
        case 4:isEmpty();
        break;
        case 5:peek();
        break;
        case 6:
        exit(0);

    }

}

}

```

ID: 224G1A0571 Page No: 71

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

### Execution Results - All test cases have succeeded!

Test Case - 1
<b>User Output</b>
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit
Enter your option :
1
Enter element :
33
Successfully pushed.
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit
Enter your option :
1
Enter element :
22
Successfully pushed.
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit
Enter your option :
1
Enter element :
55
Successfully pushed.
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit
Enter your option :
1
Enter element :
66
Successfully pushed.
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit
Enter your option :
3
Elements of the stack are : 66 55 22 33
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit

```
Enter your option :  
2  
Popped value = 66  
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit  
Enter your option :  
2  
Popped value = 55  
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit  
Enter your option :  
3  
Elements of the stack are : 22 33  
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit  
Enter your option :  
5  
Peek value = 22  
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit  
Enter your option :  
4  
Stack is not empty.  
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit  
Enter your option :  
6
```

ID: 224G1A0571 Page No: 72

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

### Test Case - 2

**User Output**

```
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit  
Enter your option :  
2  
Stack is underflow.  
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit  
Enter your option :  
3  
Stack is empty.  
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit  
Enter your option :  
5  
Stack is underflow.  
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit  
Enter your option :  
4  
Stack is empty.  
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit  
Enter your option :  
1  
Enter element :  
23  
Successfully pushed.  
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit
```

```
Enter your option :  
1  
Enter element :  
24  
Successfully pushed.  
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit  
Enter your option :  
3  
Elements of the stack are : 24 23  
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit  
Enter your option :  
5  
Peek value = 24  
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit  
Enter your option :  
2  
Popped value = 24  
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit  
Enter your option :  
2  
Popped value = 23  
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit  
Enter your option :  
2  
Stack is underflow.  
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit  
Enter your option :  
4  
Stack is empty.  
1.Push 2.Pop 3.Display 4.IsEmpty 5.Peek 6.Exit  
Enter your option :  
6
```

S.No: 19	Exp. Name: <b><i>Write a C program to implement different Operations on Queue using Array representation</i></b>	Date: 2023-06-11
----------	--	------------------

**Aim:**

Write a program to implement queue using **arrays**.

Sample Input and Output:

```

1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit
Enter your option : 1
Enter element : 23
Successfully inserted.

1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit
Enter your option : 1
Enter element : 56
Successfully inserted.

1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit
Enter your option : 3
Elements in the queue : 23 56

1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit
Enter your option : 4
Queue is not empty.

1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit
Enter your option : 5
Queue size : 2

1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit
Enter your option : 2
Deleted element = 23

1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit
Enter your option : 2
Deleted element = 56

1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit
Enter your option : 4
Queue is empty.

1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit
Enter your option : 6

```

**Source Code:**

QUsingArray.c

```

#include <conio.h>
#include <stdio.h>
#define MAX 10
int queue[MAX];
int front = -1, rear = -1;
void enqueue(int x)
{
    if (rear == MAX - 1)
    {
        printf("Queue is overflow.\n");
    }
    else
    {
        rear++;
        queue[rear] = x;
        printf("Successfully inserted.\n");
    }
    if (front == -1)
    {
        front++;
    }
}

void dequeue()
{
    if (front == -1)
    {
        printf("Queue is underflow.\n");
    }
    else
    {
        printf("Deleted element = %d\n",queue[front]);
        if (rear == front)
        {
            rear = front = -1;
        }
        else
        {
            front++;
        }
    }
}

void display()
{
    if (front == -1 && rear == -1)
    {
        printf("Queue is empty.\n");
    }
}

```

```

    else
    {
        printf("Elements in the queue : ");
        for (int i = front; i <= rear; i++)
        {
            printf("%d ",queue[i]);

        }
        printf("\n");
    }

}

void size()
{
    if(front == -1 && rear == -1)
        printf("Queue size : 0\n");
    else
        printf("Queue size : %d\n",rear-front+1);

}
void isEmpty()
{
    if(front == -1 && rear == -1)
        printf("Queue is empty.\n");
    else
        printf("Queue is not empty.\n");

}
int main()
{
    int op, x;
    while(1)
    {
        printf("1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit\n");
        printf("Enter your option : ");
        scanf("%d",&op);
        switch(op)
        {
            case 1: printf("Enter element : ");
            scanf("%d",&x);
            enqueue(x);
            break;
            case 2:
            dequeue();
            break;
            case 3:
            display();
            break;
            case 4:
            isEmpty();
            break;
            case 5:
            size();
            break;
        }
    }
}

```

```
    }  
}  
}
```

### Execution Results - All test cases have succeeded!

Test Case - 1	
<b>User Output</b>	
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit	
Enter your option :	
2	
Queue is underflow.	
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit	
Enter your option :	
3	
Queue is empty.	
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit	
Enter your option :	
4	
Queue is empty.	
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit	
Enter your option :	
5	
Queue size : 0	
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit	
Enter your option :	
1	
Enter element :	
14	
Successfully inserted.	
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit	
Enter your option :	
1	
Enter element :	
78	
Successfully inserted.	
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit	
Enter your option :	
1	
Enter element :	
53	
Successfully inserted.	
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit	
Enter your option :	

3

Elements in the queue : 14 78 53

1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit

Enter your option :

5

Queue size : 3

1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit

Enter your option :

6

### Test Case - 2

#### User Output

1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit

Enter your option :

1

Enter element :

25

Successfully inserted.

1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit

Enter your option :

2

Deleted element = 25

1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit

Enter your option :

2

Queue is underflow.

1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit

Enter your option :

3

Queue is empty.

1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit

Enter your option :

1

Enter element :

65

Successfully inserted.

1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit

Enter your option :

3

Elements in the queue : 65

1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit

Enter your option :

4

Queue is not empty.

1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit

Enter your option :

2

Deleted element = 65

1.Enqueue	2.Dequeue	3.Display	4.IsEmpty	5.Size	6.Exit
Enter your option :					
4					
Queue is empty.					
1.Enqueue	2.Dequeue	3.Display	4.IsEmpty	5.Size	6.Exit
Enter your option :					
5					
Queue size : 0					
1.Enqueue	2.Dequeue	3.Display	4.IsEmpty	5.Size	6.Exit
Enter your option :					
1					
Enter element :					
63					
Successfully inserted.					
1.Enqueue	2.Dequeue	3.Display	4.IsEmpty	5.Size	6.Exit
Enter your option :					
5					
Queue size : 1					
1.Enqueue	2.Dequeue	3.Display	4.IsEmpty	5.Size	6.Exit
Enter your option :					
6					

ID: 224G1A0571 Page No: 79

2022-2026-CSE-B

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S.No: 20	Exp. Name: <b><i>Write a C program to implement different Operations on Queue using Dynamic Array</i></b>	Date: 2023-06-11
----------	---	------------------

**Aim:**

Write a program to implement queue using **dynamic array**.

In this queue implementation has

1. a pointer 'queue' to a dynamically allocated array (used to hold the contents of the queue)
2. an integer 'maxSize' that holds the size of this array (i.e the maximum number of data that can be held in this array)
3. an integer 'front' which stores the array index of the first element in the queue
4. an integer 'rear' which stores the array index of the last element in the queue.

Sample Input and Output:

```

Enter the maximum size of the queue : 3
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option : 2
Queue is underflow.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option : 3
Queue is empty.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option : 1
Enter element : 15
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option : 1
Enter element : 16
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option : 1
Enter element : 17
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option : 1
Enter element : 18
Queue is overflow.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option : 3
Elements in the queue : 15 16 17
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option : 2
Deleted element = 15
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option : 2
Deleted element = 16
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option : 3
Elements in the queue : 17
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option : 2
Deleted element = 17
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option : 3
Queue is empty.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option : 2
Queue is underflow.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option : 4

```

**Source Code:**



```

#include <conio.h>
#include <stdio.h>
int *queue;
int front, rear;
int maxSize;
void initQueue()
{
    queue = (int *)malloc(maxSize*sizeof(int));
    front = -1;
    rear = -1;
}

void enqueue(int x)
{
    if (rear == maxSize - 1)
    {
        printf("Queue is overflow.\n");
    }
    else
    {
        rear++;
        queue[rear] = x;
        printf("Successfully inserted.\n");
    }
    if (front == -1)
    {
        front++;
    }
}

void dequeue()
{
    if (front == -1)
    {
        printf("Queue is underflow.\n");
    }
    else
    {
        printf("Deleted element = %d\n", *
(queue+front));
        if (rear == front)
        {
            rear = front = -1;
        }
        else
        {
            front++;
        }
    }
}

void display()
{
    if (front ==
-1 && rear == -1)
    {
}

```

```

        else
        {
            printf("Elements in the queue : ");

            for (int i = front; i <= rear; i++)
            {

                printf("%d ",*(queue+i));

            }

            printf("\n");
        }

    }

    int main()
    {
        int op, x;

        printf("Enter the maximum size of the queue : ");
        scanf("%d",
        &maxSize);

        initQueue();
        while(1)
        {

            printf("1.Enqueue 2.Dequeue 3.Display 4.Exit\n");

            printf("Enter your option : ");

            scanf("%d",&op);

            switch(op)
            {

                case 1:

                    printf("Enter element : ");

                    scanf("%d",&x);

                    enqueue(x);

                    break;

                case 2:

                    dequeue();

                    break;

                case 3:

```

```

break;

case 4:

exit(0);

}

}

}

```

ID: 224G1A0571 Page No: 84

2022-2026-CSE-B

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### Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter the maximum size of the queue :
3
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
2
Queue is underflow.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
3
Queue is empty.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
1
Enter element :
15
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
1
Enter element :
16
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
1
Enter element :
17
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.Exit
Enter your option :
1

```
Enter element :  
18  
Queue is overflow.  
1.Enqueue 2.Dequeue 3.Display 4.Exit  
Enter your option :  
3  
Elements in the queue : 15 16 17  
1.Enqueue 2.Dequeue 3.Display 4.Exit  
Enter your option :  
2  
Deleted element = 15  
1.Enqueue 2.Dequeue 3.Display 4.Exit  
Enter your option :  
2  
Deleted element = 16  
1.Enqueue 2.Dequeue 3.Display 4.Exit  
Enter your option :  
3  
Elements in the queue : 17  
1.Enqueue 2.Dequeue 3.Display 4.Exit  
Enter your option :  
2  
Deleted element = 17  
1.Enqueue 2.Dequeue 3.Display 4.Exit  
Enter your option :  
3  
Queue is empty.  
1.Enqueue 2.Dequeue 3.Display 4.Exit  
Enter your option :  
2  
Queue is underflow.  
1.Enqueue 2.Dequeue 3.Display 4.Exit  
Enter your option :  
4
```

ID: 224G1A0571 Page No: 85

2022-2026-CSE-B

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### Test Case - 2

#### User Output

```
Enter the maximum size of the queue :  
2  
1.Enqueue 2.Dequeue 3.Display 4.Exit  
Enter your option :  
1  
Enter element :  
34  
Successfully inserted.  
1.Enqueue 2.Dequeue 3.Display 4.Exit  
Enter your option :  
1
```

```
Enter element :  
56  
Successfully inserted.  
1.Enqueue 2.Dequeue 3.Display 4.Exit  
Enter your option :  
1  
Enter element :  
45  
Queue is overflow.  
1.Enqueue 2.Dequeue 3.Display 4.Exit  
Enter your option :  
3  
Elements in the queue : 34 56  
1.Enqueue 2.Dequeue 3.Display 4.Exit  
Enter your option :  
2  
Deleted element = 34  
1.Enqueue 2.Dequeue 3.Display 4.Exit  
Enter your option :  
2  
Deleted element = 56  
1.Enqueue 2.Dequeue 3.Display 4.Exit  
Enter your option :  
2  
Queue is underflow.  
1.Enqueue 2.Dequeue 3.Display 4.Exit  
Enter your option :  
2  
Queue is underflow.  
1.Enqueue 2.Dequeue 3.Display 4.Exit  
Enter your option :  
3  
Queue is empty.  
1.Enqueue 2.Dequeue 3.Display 4.Exit  
Enter your option :  
1  
Enter element :  
56  
Successfully inserted.  
1.Enqueue 2.Dequeue 3.Display 4.Exit  
Enter your option :  
3  
Elements in the queue : 56  
1.Enqueue 2.Dequeue 3.Display 4.Exit  
Enter your option :  
4
```

S.No: 21	Exp. Name: <b><i>Write a C program to implement different Operations on Queue using Linked Lists</i></b>	Date: 2023-06-11
----------	--	------------------

**Aim:**

Write a program to implement queue using **linked lists**.

Sample Input and Output:

```

1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit
Enter your option : 1
Enter element : 57
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit
Enter your option : 1
Enter element : 87
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit
Enter your option : 5
Queue size : 2
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit
Enter your option : 3
Elements in the queue : 57 87
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit
Enter your option : 2
Deleted value = 57
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit
Enter your option : 2
Deleted value = 87
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit
Enter your option : 3
Queue is empty.
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit
Enter your option : 5
Queue size : 0
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit
Enter your option : 6

```

**Source Code:**

QUsingLL.c

ID: 224G1A0571 Page No: 87

2022-2026-CSE-B

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```

#include <conio.h>
#include <stdio.h>
struct queue
{
    int data;
    struct queue *next;
};
typedef struct queue *Q;
Q front = NULL, rear = NULL;
void enqueue(int element)
{
    Q temp = NULL;
    temp = (Q)malloc(sizeof(struct queue));
    if(temp == NULL)
    {
        printf("Queue is overflow.\n");
    }
    else
    {
        temp -> data = element;
        temp -> next = NULL;
        if(front == NULL)
        {
            front = temp;
        }
        else
        {
            rear -> next = temp;
        }
        rear = temp;
        printf("Successfully inserted.\n");
    }
}
void dequeue()
{
    Q temp = NULL;
    if(front == NULL)
    {
        printf("Queue is
underflow.\n");
    }
    else
    {
        temp = front;
        if (front == rear)
        {
            front = rear
= NULL;
        }
        else
        {
            front = front -> next;
        }
    }
}

```

```
free(temp);

}

}

void

{

display()

{

if(front == NULL)

{

printf("Queue is empty.\n");

}

else

{
```

**ID: 224G1A0571** Page No: 89

**2022-2026-CSE-B**

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```
Q temp = front;
```

```
printf("Elements in the queue : ");
```

```
while(temp != NULL)
```

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2022-2026-CSE-B

ID: 224G1A0571 Page No: 93

```
printf("%d ", temp -> data);
```

```
temp = temp -> next;
```

}

```
printf("\n");
```

}

}

```
void size()
```

{

```
int count =0;
```

```
if(front == NULL)
```

{

```
printf("Queue size : 0\n");
```

}

else

{

```
Q temp = front;
```

```
while(temp != NULL)
```

{

```
temp = temp -> next;
```

```
count = count + 1;
```

}

```
printf("Queue size : %d\n",count);
```

}

}

```
void isEmpty()
```



```
if(front == NULL )
```

{

```
printf("Queue is empty.\n");
```

}

ID: 24G1A0571 Page No: 123

2022-2026-CSE-B

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else

**ID: 24G1A0571** Page No: 124

**2022-2026-CSE-B**

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```
empty.\n");
```

```
printf("Queue is not
```

**ID: 224G1A0571** Page No: 126

Srinivasa Ramanujan Institute of Technology  
**2022-2026-CSE-B**

}

}

```
int main()
```

{

```
int op, x;
```

**ID: 224G1A0571** Page No: 131

**2022-2026-CSE-B**

Srinivasa Ramanujan Institute of Technology





```
printf("1.Enqueue 2.Dequeue 3.Display 4.Is Empty 5.Size 6.Exit\n");
```

```
printf("Enter your option : ");

scanf("%d",&op);

switch(op)

{

case 1:

printf("Enter element : ");

scanf("%d",&x);

enqueue(x);

break;

case 2:

dequeue();

break;

case 3:

display();

break;

case 4:

isEmpty();

break;

case 5:

size();

break;

case 6:

exit(0);

}

}

}
```

## Execution Results - All test cases have succeeded!

Test Case - 1
<b>User Output</b>
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit
Enter your option :
2
Queue is underflow.
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit
Enter your option :
3
Queue is empty.
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit
Enter your option :
4
Queue is empty.
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit
Enter your option :
5
Queue size : 0
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit
Enter your option :
1
Enter element :
44
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit
Enter your option :
1
Enter element :
55
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit
Enter your option :
1
Enter element :
66
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit
Enter your option :
1
Enter element :
67
Successfully inserted.
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit
Enter your option :
3
Elements in the queue : 44 55 66 67
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit

ID: 224G1A0571 Page No: 136

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

```
Enter your option :  
2  
Deleted value = 44  
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit  
Enter your option :  
2  
Deleted value = 55  
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit  
Enter your option :  
5  
Queue size : 2  
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit  
Enter your option :  
4  
Queue is not empty.  
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit  
Enter your option :  
6
```

ID: 224G1A0571 Page No: 137

2022-2026-CSE-B

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### Test Case - 2

**User Output**

```
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit  
Enter your option :  
1  
Enter element :  
23  
Successfully inserted.  
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit  
Enter your option :  
1  
Enter element :  
234  
Successfully inserted.  
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit  
Enter your option :  
1  
Enter element :  
45  
Successfully inserted.  
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit  
Enter your option :  
1  
Enter element :  
456  
Successfully inserted.  
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit  
Enter your option :  
2
```

```
Deleted value = 23
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit
Enter your option :
3
Elements in the queue : 234 45 456
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit
Enter your option :
2
Deleted value = 234
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit
Enter your option :
3
Elements in the queue : 45 456
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit
Enter your option :
4
Queue is not empty.
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit
Enter your option :
5
Queue size : 2
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit
Enter your option :
3
Elements in the queue : 45 456
1.Enqueue 2.Dequeue 3.Display 4.IsEmpty 5.Size 6.Exit
Enter your option :
6
```

ID: 224G1A0571 Page No: 138

2022-2026-CSE-B

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**S.No: 22**

Exp. Name: ***Reversing the links of a linked list***

**Date: 2023-06-11**

**Aim:**

Write a C program to reverse the links (not just displaying) of a linked list.

Note: Add node at the beginning.

**Source Code:**

reverseLinkedList.c

ID: 224G1A0571 Page No: 139

2022-2026-CSE-B

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```

#include <stdio.h>
#include <stdlib.h>
struct Node
{
    int data;
    struct Node* next;
};
static void reverse(struct Node** head_ref)
{
    struct Node* prev = NULL;
    struct Node* current = *head_ref;
    struct Node* next = NULL;
    while (current != NULL)
    {
        next = current->next;
        current->next = prev;
        prev = current;
        current = next;
    }
    *head_ref = prev;
}
void push(struct Node** head_ref, int new_data)
{
    struct Node* new_node = (struct Node*) malloc(sizeof(struct
Node));
    new_node->data = new_data;
    new_node->next = (*head_ref);
    (*head_ref) = new_node;
}
void printList(struct Node* head)
{
    struct Node* temp = head;
    while (temp != NULL)
    {
        printf("%d", temp->data);
        if (temp->next != NULL)
        {
            printf("->");
        }
        temp = temp->next;
    }
}
int main()
{
    struct Node* head = NULL;
    int i, count = 0, num = 0;
    printf("How many numbers
you want to enter:");
    scanf(" %d", &count);
    for (i = 0; i < count; i++)
    {
        printf("Enter number
%d:", i+1);
        scanf(" %d", &num);
        push(&head, num);
    }
}

```

```

list:");
printList(head);
reverse(&head);
printf("\nReversed
linked list:");
printList(head);

}

```

### Execution Results - All test cases have succeeded!

Test Case - 1
<b>User Output</b>
How many numbers you want to enter:
4
Enter number 1:
6
Enter number 2:
1
Enter number 3:
8
Enter number 4:
5
Given linked list:5->8->1->6
Reversed linked list:6->1->8->5

Test Case - 2
<b>User Output</b>
How many numbers you want to enter:
2
Enter number 1:
5
Enter number 2:
9
Given linked list:9->5
Reversed linked list:5->9

S.No: 23	Exp. Name: <b><i>Program to insert into BST and traversal using In-order, Pre-order and Post-order</i></b>	Date: 2023-06-18
----------	--	------------------

**Aim:**

Write a program to create a binary search tree of integers and perform the following operations using linked list.

- 5. Insert a node
- 6. In-order traversal
- 7. Pre-order traversal
- 8. Post-order traversal

**Source Code:**

BinarySearchTree.c
--------------------

ID: 224G1A0571 Page No: 142

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

```

#include<stdio.h>
#include<stdlib.h>
struct node
{
    int data;
    struct node *left, *right;
};

typedef struct node *BSTNODE;
BSTNODE newNodeInBST(int item)
{
    BSTNODE temp = (BSTNODE)malloc(sizeof(struct node));
    temp->data = item;
    temp->left = temp->right = NULL;
    return temp;
}
void inorderInBST(BSTNODE root)
{
    if (root != NULL)
    {
        inorderInBST(root->left);
        printf("%d ", root->data);
        inorderInBST(root->right);
    }
}
void preorderInBST(BSTNODE root)
{
    if (root != NULL)
    {
        printf("%d ", root->data);
        preorderInBST(root->left);
        preorderInBST(root->right);
    }
}
void postorderInBST(BSTNODE root)
{
    if (root != NULL)
    {
        postorderInBST(root->left);
        postorderInBST(root->right);
        printf("%d ", root->data);
    }
}
BSTNODE insertNodeInBST(BSTNODE node, int ele)
{
    if (node == NULL)
    {
        printf("Successfully inserted.\n");
        return newNodeInBST(ele);
    }
    if (ele < node->data)
        node->left = insertNodeInBST(node-
>left,ele);
    else if (ele > node->data)    node-

```

```

exists in BST.\n");
        return node;
    }
    void main()
    {
        int x, op;
        BSTNODE root = NULL;
        while(1)
        {
            printf("1.Insert
2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit\n");
            printf("Enter your
option : ");
            scanf("%d", &op);
            switch(op)
            {
                case 1:
                    printf("Enter an element to be inserted : ");
                    scanf("%d",
&x);
                    insertNodeInBST(root,x);
                    break;
                case 2:
                    if(root ==
NULL)
                    {
                        printf("Binary Search Tree is empty.\n");
                    }
                    else
                    {
                        printf("Elements of the BST (in-order traversal): ");
                        inorderInBST(root);
                        printf("\n");
                    }
                    break;
                case 3:
                    if(root == NULL)
                    {
                        printf("Binary Search Tree is empty.\n");
                    }
                    else

```

ID: 224G1A0571 Page No: 144

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

```

printf("Elements of the BST (pre-order traversal): ");

preorderInBST(root);

printf("\n");

}

break;

case 4:

if(root == NULL)

{

printf("Binary Search Tree is empty.\n");

}

else

{

printf("Elements of the BST (post-order traversal): ");

postorderInBST(root);

printf("\n");

}

break;

case 5:

exit(0);

}
}
}

```

ID: 224G1A0571 Page No: 145

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

### Execution Results - All test cases have succeeded!

Test Case - 1
<b>User Output</b>
1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit
Enter your option :
1

```
Enter an element to be inserted :  
100  
Successfully inserted.  
1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit  
Enter your option :  
1  
Enter an element to be inserted :  
20  
Successfully inserted.  
1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit  
Enter your option :  
1  
Enter an element to be inserted :  
200  
Successfully inserted.  
1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit  
Enter your option :  
1  
Enter an element to be inserted :  
10  
Successfully inserted.  
1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit  
Enter your option :  
1  
Enter an element to be inserted :  
30  
Successfully inserted.  
1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit  
Enter your option :  
1  
Enter an element to be inserted :  
150  
Successfully inserted.  
1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit  
Enter your option :  
2  
Elements of the BST (in-order traversal): 10 20 30 100 150 200 300  
1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit  
Enter your option :  
3  
Elements of the BST (pre-order traversal): 100 20 10 30 200 150 300  
1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit  
Enter your option :
```

4

Elements of the BST (post-order traversal): 10 30 20 150 300 200 100

1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit

Enter your option :

5

### Test Case - 2

#### User Output

1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit

Enter your option :

1

Enter an element to be inserted :

25

Successfully inserted.

1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit

Enter your option :

1

Enter an element to be inserted :

63

Successfully inserted.

1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit

Enter your option :

1

Enter an element to be inserted :

89

Successfully inserted.

1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit

Enter your option :

1

Enter an element to be inserted :

45

Successfully inserted.

1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit

Enter your option :

1

Enter an element to be inserted :

65

Successfully inserted.

1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit

Enter your option :

1

Enter an element to be inserted :

28

Successfully inserted.

1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit

Enter your option :

4

Elements of the BST (post-order traversal): 28 45 65 89 63 25

1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit

Enter your option :

3

Elements of the BST (pre-order traversal): 25 63 45 28 89 65

1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit

Enter your option :

2

Elements of the BST (in-order traversal): 25 28 45 63 65 89

1.Insert 2.Inorder Traversal 3.Preorder Traversal 4.Postorder Traversal 5.Exit

Enter your option :

5

ID: 224G1A0571 Page No: 148

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

S.No: 24	Exp. Name: <b><i>Write a Program to Search an element using Binary Search and Recursion</i></b>	Date: 2023-06-18
----------	---	------------------

**Aim:**

Write a program to [search](#) the given element from a list of elements with [binary search](#) technique using **recursion**.

At the time of execution, the program should print the message on the console as:

Enter value of n :

For example, if the user gives the **input** as:

Enter value of n : 5

Next, the program should print the following messages one by one on the console as:

Enter 5 elements :

if the user gives the **input** as:

Enter 5 elements : 33 55 22 44 11

then the program should **print** the result as:

After sorting the elements are : 11 22 33 44 55

Next, the program should print the message on the console as:

Enter key element :

if the user gives the **input** as:

Enter key element : 11

then the program should **print** the result as:

The given key element 11 is found at position : 0

Similarly, if the key element is given as [18](#) for the above example then the program should print the output as:

The given key element 18 is not found

**Note:** Write the functions **read()**, **bubbleSort()**, **display()** and **binarySearch()** in [BinarySearch.c](#)

**Source Code:**

[BinarySearch.c](#)

ID: 24G1A0571 Page No: 149

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

```

#include <stdio.h>
void read(int a[20], int n)
{
    int i;
    printf("Enter %d elements : ", n);
    for (i = 0; i < n; i++)
    {
        scanf("%d", &a[i]);
    }
}
void bubbleSort(int a[20], int n)
{
    int i, j, temp;
    for (i = 0; i < n - 1; i++)
    {
        for (j = 0; j < n - i - 1; j++)
        {
            if (a[j] > a[j+1])
            {
                temp = a[j];
                a[j] = a[j+1];
                a[j+1] = temp;
            }
        }
    }
}
void display(int a[20], int n)
{
    int i;
    for (i = 0; i < n; i++)
    {
        printf("%d ", a[i]);
    }
    printf("\n");
}
int binarySearch(int a[20], int low, int
high, int key)
{
    int mid;
    if (low <= high)
    {
        mid = (low + high) / 2;
        if (a[mid] == key)
            return mid;
        else if (key < a[mid])
            binarySearch(a, low, mid -
1, key);
        else if (key > a[mid])
            binarySearch(a, mid + 1,
high, key);
    }
    else
    {
        return -1;
    }
}

```

```

void main()
{
    int a[20],
n, key, flag;

printf("Enter value of n : ");
scanf("%d",
&n);
read(a, n);

bubbleSort(a, n);

printf("After sorting the elements are : ");
display(a,
n);

printf("Enter key element : ");
scanf("%d",
&key);
flag =
binarySearch(a, 0, n - 1, key);
if (flag ==
-1)
{
printf("The given key element %d is not found\n", key);
}
else
{
printf("The given key element %d is found at position : %d\n", key, flag);
}

}

```

ID: 224G1A0571 Page No: 151

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

### Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter value of n :
5
Enter 5 elements :
33 55 22 44 11
After sorting the elements are : 11 22 33 44 55
Enter key element :
11
The given key element 11 is found at position : 0

### Test Case - 2

**User Output**

Enter value of n :

4

Enter 4 elements :

23 9 45 18

After sorting the elements are : 9 18 23 45

Enter key element :

24

The given key element 24 is not found

Page No: 152

ID: 24G1A0571

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

S.No: 25	Exp. Name: <b><i>Graph traversals implementation - Breadth First Search</i></b>	Date: 2023-06-18
----------	---	------------------

**Aim:**

Write a program to implement Breadth First Search of a graph.

**Source Code:**

GraphsBFS.c

ID: 224G1A0571 Page No: 153

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

```

#include <stdio.h>
#include <stdlib.h>
#define MAX 99
struct node
{
    struct node *next;
    int vertex;
};
typedef struct node * GNODE;
GNODE graph[20];
int visited[20];
int queue[MAX], front = -1,rear = -1;
int n;
void insertQueue(int vertex)
{
    if(rear == MAX-1)
        printf("Queue Overflow.\n");
    else
    {
        if(front == -1)
            front = 0;
        rear = rear+1;
        queue[rear] = vertex ;
    }
}
int isEmptyQueue()
{
    if(front == -1 || front > rear)
        return 1;
    else    return 0;
}
int deleteQueue()
{
    int deleteItem;
    if(front == -1 || front > rear)
    {
        printf("Queue Underflow\n");
        exit(1);
    }
    deleteItem = queue[front];
    front = front+1;
    return deleteItem;
}
void BFS(int v)
{
    int w;
    insertQueue(v);
    while(!isEmptyQueue())
    {
        w = deleteQueue();
        printf("\n%d",w);
        visited[w]=1;
        GNODE g = graph[v];
        for(;g!=NULL;g=g->next)
        {

```

```

insertQueue(w);

visited[w]=1;

}

}

}

}

void main()
{
    int

N, E, s, d, i, j, v;

GNODE p, q;

printf("Enter the number of vertices : ");

scanf("%d",&N);

printf("Enter the number of edges : ");

scanf("%d",&E); for(i=1;i<=E;i++)

{

printf("Enter source : ");

scanf("%d",&s);

printf("Enter destination : ");

scanf("%d",&d);

q=(GNODE)malloc(sizeof(struct node));

q->vertex=d;

q->next=NULL;

if(graph[s]==NULL)

{

graph[s]=q;

}

else

{

```

```

p=graph[s];

while(p->next!=NULL)

p=p->next;

p->next=q;

}

}

for(i=1;i<=n;i++)

visited[i]=0;

printf("Enter Start Vertex for BFS : ");

scanf("%d", &v);

printf("BFS of graph : ");

BFS(v);

printf("\n");
}

```

ID: 24G1A0571 Page No: 156

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

### Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter the number of vertices :
5
Enter the number of edges :
5
Enter source :
1
Enter destination :
2
Enter source :
1
Enter destination :
4
Enter source :
4
Enter destination :
2
Enter source :
2

Enter destination :
3
Enter source :
4
Enter destination :
5
Enter Start Vertex for BFS :
1
BFS of graph :
1
2
4
3
5

ID: 224G1A0571 Page No: 157

<b>Test Case - 2</b>	
<b>User Output</b>	
Enter the number of vertices :	
4	
Enter the number of edges :	
3	
Enter source :	
1	
Enter destination :	
2	
Enter source :	
2	
Enter destination :	
3	
Enter source :	
3	
Enter destination :	
4	
Enter Start Vertex for BFS :	
2	
BFS of graph :	
2	
3	
4	

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

S.No: 26	Exp. Name: <b><i>Graph traversals implementation - Depth First Search</i></b>	Date: 2023-06-18
----------	---	------------------

**Aim:**

Write a program to implement Depth First Search for a graph.

**Source Code:**

GraphsDFS.c

ID: 224G1A0571 Page No: 158

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

```

#include<stdio.h>
#include<stdlib.h>
struct node
{
    struct node *next;
    int vertex;
};

typedef struct node * GNODE;
GNODE graph[20];
int visited[20];
int n;
void DFS(int i)
{
    GNODE p;
    printf("\n%d",i);
    p=graph[i];
    visited[i]=1;
    while(p!=NULL)
    {
        i=p->vertex;
        if(!visited[i])
            DFS(i);
        p=p->next;
    }
}
void main()
{
    int N,E,i,s,d,v;
    GNODE q,p;
    printf("Enter the number of vertices : ");
    scanf("%d",&N);
    printf("Enter the number of edges : ");
    scanf("%d",&E); for(i=1;i<=E;i++)
    {
        printf("Enter source : ");
        scanf("%d",&s);
        printf("Enter destination : ");
        scanf("%d",&d);
        q=(GNODE)malloc(sizeof(struct node));
        q->vertex=d;
        q->next=NULL;
        if(graph[s]==NULL)
            graph[s]=q;
        else
        {
            p=graph[s];
            while(p->next!=NULL)
                p=p->next;
            p->next=q;
        }
    }
    for(i=0;i<n;i++)
        visited[i]=0;
    printf("Enter Start Vertex for DFS : ");
}

```

```
    DFS(v);
    printf("\n");

}
```

### Execution Results - All test cases have succeeded!

Test Case - 1
<b>User Output</b>
Enter the number of vertices :
6
Enter the number of edges :
7
Enter source :
1
Enter destination :
2
Enter source :
1
Enter destination :
4
Enter source :
4
Enter destination :
2
Enter source :
2
Enter destination :
3
Enter source :
4
Enter destination :
5
Enter source :
1
Enter destination :
3
Enter source :
3
Enter destination :
6
Enter Start Vertex for DFS :
1
DFS of graph :
1
2

3  
6  
4  
5

### Test Case - 2

#### User Output

Enter the number of vertices :

5

Enter the number of edges :

5

Enter source :

1

Enter destination :

2

Enter source :

1

Enter destination :

4

Enter source :

4

Enter destination :

2

Enter source :

2

Enter destination :

3

Enter source :

4

Enter destination :

5

Enter Start Vertex for DFS :

1

DFS of graph :

1

2

3

4

5

S.No: 27	Exp. Name: <b>Travelling Sales Person problem using Dynamic programming</b>	Date: 2023-06-24
----------	---	------------------

**Aim:**

Write a C program to implement **Travelling Sales Person** problem using **Dynamic programming**.

**Source Code:**

TSP.c

ID: 224G1A0571 Page No: 162

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

```

#include<stdio.h>
int ary[10][10], completed[10], n, cost = 0;
void takeInput()
{
    int i, j;
    printf("Number of villages: ");
    scanf("%d", &n);    for (i = 0; i < n; i++)
    {
        for (j = 0; j < n; j++)
            scanf("%d", &ary[i][j]);
        completed[i] = 0;
    }
    printf("The cost list is:");
    for (i = 0; i < n; i++)
    {
        printf("\n");
        for (j = 0; j < n; j++)
            printf("\t%d", ary[i][j]);
    }
}
void mincost(int city)
{
    int i, ncity;
    completed[city] = 1;
    printf("%d-->", city + 1);
    ncity = least(city);
    if (ncity == 999)
    {
        ncity = 0;
        printf("%d", ncity + 1);
        cost += ary[city][ncity];
        return;
    }
    mincost(ncity);
}
int least(int c)
{
    int i, nc = 999;
    int min = 999, kmin;
    for (i = 0; i < n; i++)
    {
        if ((ary[c][i] != 0) && (completed[i] == 0))
if (ary[c][i] + ary[i][c] < min)
{
    min = ary[i][0] + ary[c][i];
    kmin = ary[c][i];
    nc = i;
}
if (min != 999)
    cost += kmin;
return nc;
}
int main()
{

```

ID: 224G1A0571 Page No: 163

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

```
    mincost(0);
    printf("\nMinimum cost is
           return 0;
}
```

### Execution Results - All test cases have succeeded!

Test Case - 1
<b>User Output</b>
Number of villages:
3
0 10 15
10 0 35
15 35 0
The cost list is:
0 10 15
10 0 35
15 35 0
The Path is:
1-->2-->3-->1
Minimum cost is 60

ID: 24G1A0571 Page No: 164

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

S.No: 28

Exp. Name: **Write a C program to Open a File and to Print its contents on the screen**

Date: 2023-04-24

**Aim:**

Follow the instructions given below to write a program to [open](#) a file and to [print](#) its **contents** on the screen.

- Open a new file "[SampleText1.txt](#)" in write mode
- Write the content in the file
- Close the file
- Open the same file in read mode
- Read the content from file and print them on the screen
- Close the file

**Source Code:**

file1.c

```
#include<stdio.h>
void main()
{
    FILE *fp;
    char ch;
    fp=fopen("SampleText1.txt", "w");
    printf("Enter the text with @ at end : ");
    while((ch =getchar()) != '@')
    {
        putc(ch,fp);
    }
    putc(ch,fp);
    fclose(fp);
    fp=fopen("SampleText1.txt","r");
    printf("Given message is : ");
    while((ch=getc(fp)) != '@')
    {
        putchar(ch);
    }
    printf("\n");
    fclose(fp);
}
```

ID: 224G1A0571 Page No: 165

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

**Execution Results - All test cases have succeeded!**

**Test Case - 1**

**User Output**

Enter the text with @ at end :

CodeTantra is a

Startup Company recognized by Government  
of India@

Given message is : CodeTantra is a

Startup Company recognized by Government of India

**Test Case - 2**

**User Output**

Enter the text with @ at end :

CodeTantra is

increasing development of Languages Year

by Year@

Given message is : CodeTantra is

increasing development of Languages Year

by Year

ID: 24G1A0571 Page No: 166

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

S.No: 29	Exp. Name: <b><i>Write a C program to Copy contents of one File into another File</i></b>	Date: 2023-06-25
----------	---	------------------

**Aim:**

Write a program to **copy** contents of one file into another file. Follow the instructions given below to write a program to copy the contents of one file to another file:

- Open a new file "**SampleTextFile1.txt**" in write mode
- Write the content onto the file
- Close the file
- Open an existing file "**SampleTextFile1.txt**" in read mode
- Open a new file "**SampleTextFile2.txt**" in write mode
- Copy the content from existing file to new file
- Close the files
- Open the copied file in read mode
- Read the text from file and print on the screen
- Close the file

**Source Code:**

**CopyFile.c**

```
#include <stdio.h>
void main()
{
    FILE *fp, *fp1, *fp2;
    char ch;
    fp = fopen("SampleTextFile1.txt", "w");
    printf("Enter the text with @ at end : ");
    while ((ch = getchar()) != '@')
    {
        putc(ch, fp);
    }
    putc(ch, fp);
    fclose(fp);
    fp1 = fopen("SampleTextFile1.txt", "r");
    fp2 = fopen("SampleTextFile2.txt", "w");
    while ((ch = getc(fp1)) != '@')
    {
        putc(ch, fp2);
    }
    putc(ch, fp2);
    fclose(fp1);
    fclose(fp2);
    fp2 = fopen("SampleTextFile2.txt", "r");
    printf("Copied text is : ");
    while ((ch = getc(fp2)) != '@')
    {
        putchar(ch);
    }
    printf("\n");
    fclose(fp2);
}
```

ID: 224G1A0571 Page No: 167

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

## Execution Results - All test cases have succeeded!

Test Case - 1
<b>User Output</b>
Enter the text with @ at end :
CodeTantra started in the year 2014@
Copied text is : CodeTantra started in the year 2014

Test Case - 2
<b>User Output</b>
Enter the text with @ at end :
CodeTantra received
best Startup award from Hysea in 2016@
Copied text is : CodeTantra received
best Startup award from Hysea in 2016

ID: 224G1A0571 Page No: 168

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

S.No: 30	Exp. Name: <b><i>Write a C program to Merge two Files and stores their contents in another File</i></b>	Date: 2023-06-25
----------	---	------------------

**Aim:**

Write a program to `merge` two files and stores their contents in another file.

- Open a new file "`SampleDataFile1.txt`" in write mode
- Write the content onto the file
- Close the file
- Open another new file "`SampleDataFile2.txt`" in write mode
- Write the content onto the file
- Close the file
- Open first existing file "`SampleDataFile1.txt`" in read mode
- Open a new file "`SampleDataFile3.txt`" in write mode
- Copy the content from first existing file to new file
- Close the first existing file
- Open another existing file "`SampleDataFile2.txt`" in read mode
- Copy its content from existing file to new file
- Close that existing file
- Close the merged file

**Source Code:**

```
Merge.c
```

ID: 24G1A0571 Page No: 169

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

```

#include <stdio.h>
void main()
{
    FILE *fp1, *fp2, *fp3;
    char ch;
    fp1 = fopen("SampleDataFile1.txt", "w");
    printf("Enter the text with @ at end for file-1 :\n");
    while ((ch = getchar()) != '@')
    {
        putc(ch, fp1);
    }
    putc(ch, fp1);
    fclose(fp1);
    fp2 = fopen("SampleDataFile2.txt", "w");
    printf("Enter the text with @ at end for file-2 :\n");
    while ((ch = getchar()) != '@')
    {
        putc(ch, fp2);
    }
    putc(ch, fp2);
    fclose(fp2);
    fp1 = fopen("SampleDataFile1.txt", "r");
    fp3 = fopen("SampleDataFile3.txt", "w");
    while ((ch = getc(fp1)) != '@')
    {
        putc(ch, fp3);
    }
    fclose(fp1);
    fp2 = fopen("SampleDataFile2.txt", "r");
    while ((ch = getc(fp2)) != '@')
    {
        putc(ch, fp3);
    }
    putc(ch, fp3);
    fclose(fp2);
    fclose(fp3);
    fp3 = fopen("SampleDataFile3.txt", "r");
    printf("Merged text is : ");
    while ((ch = getc(fp3)) != '@')
    {
        putchar(ch);
    }
    printf("\n");
    fclose(fp3);
}

```

ID: 224G1A0571 Page No: 170

2022-2026-CSE-B

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### Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter the text with @ at end for file-1 :
CodeTantra developed an interactive tool

in the year 2014
CodeTantra got best Startup award in 2016@
Enter the text with @ at end for file-2 :
Now lot of Companies and Colleges using
CodeTantra Tool@
Merged text is : CodeTantra developed an interactive tool
in the year 2014
CodeTantra got best Startup award in 2016
Now lot of Companies and Colleges using CodeTantra Tool

ID: 224G1A0571 Page No: 171

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

**Aim:**

Write a program to [\(delete\)](#) a **file**.

**Note:** Use the [remove\(fileName\)](#) function to delete an existing file.

**Source Code:**

Delete.c

```
#include <stdio.h>
void main()
{
    FILE *fp;
    int status;
    char fileName[40], ch;
    printf("Enter a new file name : ");
    gets(fileName);
    fp = fopen(fileName, "w");
    printf("Enter the text with @ at end : ");
    while ((ch = getchar()) != '@')
    {
        putc(ch, fp);
    }
    putc(ch, fp);
    fclose(fp);
    fp = fopen(fileName, "r");
    printf("Given message is : ");
    while ((ch = getc(fp)) != '@')
    {
        putchar(ch);
    }
    printf("\n");
    fclose(fp);
    status = remove(fileName);
    if (status == 0)
        printf("%s file is deleted successfully\n", fileName);
    else
    {
        printf("Unable to delete the file -- ");
        perror("Error\n");
    }
}
```

ID: 24G1A0571 Page No: 172

2022-2026-CSE-B

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**Execution Results** - All test cases have succeeded!

Test Case - 1
<b>User Output</b>
Enter a new file name :
Text1.txt
Enter the text with @ at end :

This is CodeTantra@

Given message is : This is CodeTantra

Text1.txt file is deleted successfully

### Test Case - 2

#### User Output

Enter a new file name :

Text2.txt

Enter the text with @ at end :

C developed by Dennis Ritchie@

Given message is : C developed by Dennis Ritchie

Text2.txt file is deleted successfully

Page No:

173

ID: 24G1A0571

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

S.No: 32	Exp. Name: <b><i>Write a C program to Copy last n characters from one File to another File</i></b>	Date: 2023-06-24
----------	--	------------------

**Aim:**

Write a program to `copy` last `n` characters from **file-1** to **file-2**.

- open a new file "`TestDataFile1.txt`" in write mode
- write the content onto the file
- close the file
- open an existing file "`TestDataFile1.txt`" in read mode
- open a new file "`TestDataFile2.txt`" in write mode
- read the number of characters to copy
- set the cursor position by using `fseek()`
- copy the content from existing file to new file
- close the files
- open the copied file "`TestDataFile2.txt`" in read mode
- read the text from file and print on the screen
- close the file

**Source Code:**

`Copy.c`

ID: 224G1A0571 Page No: 174

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

```

#include <stdio.h>
void main()
{
    FILE *fp, *fp1, *fp2;
    int num, length;
    char ch;
    fp = fopen("TestDataFile1.txt", "w");
    printf("Enter the text with @ at end : ");
    while ((ch = getchar()) != '@')
    {
        putc(ch, fp);
    }
    putc(ch, fp);
    fclose(fp);
    fp1 = fopen("TestDataFile1.txt", "r");
    fp2 = fopen("TestDataFile2.txt", "w");
    printf("Enter number of characters to copy : ");
    scanf("%d", &num);
    fseek(fp1, 0L, SEEK_END);
    length = ftell(fp1);
    fseek(fp1, (length - num - 1), SEEK_SET);
    while ((ch = getc(fp1)) != '@')
    {
        putc(ch, fp2);
    }
    putc(ch, fp2);
    fclose(fp1);
    fclose(fp2);
    fp2 = fopen("TestDataFile2.txt", "r");
    printf("Copied text is : ");
    while ((ch = getc(fp2)) != '@')
    {
        putchar(ch);
    }
    printf("\n");
    fclose(fp2);
}

```

ID: 224G1A0571 Page No: 175

2022-2026-CSE-B

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### Execution Results - All test cases have succeeded!

Test Case - 1
<b>User Output</b>
Enter the text with @ at end :
We should not give up
and we should not allow the problem to
defeat us@
Enter number of characters to copy :
15
Copied text is : em to defeat us

**Test Case - 2**

**User Output**

Enter the text with @ at end :

You have to dream

before

Your dreams can come true@

Enter number of characters to copy :

20

Copied text is : dreams can come true

ID: 24G1A0571 Page No: 176

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

S.No: 33	Exp. Name: <b><i>Write a C program to Reverse first n characters in a File</i></b>	Date: 2023-06-24
----------	--	------------------

**Aim:**

Write a program to **reverse** the first **n** characters in a file.

- open a new file "**TestDataFile3.txt**" in read/write mode
- write the content onto the file
- read the number of characters to copy
- copy the specified number of characters into a string
- reverse the string
- overwrite the entire string into the file from the begining
- close the file
- open the copied file "**TestDataFile3.txt**" in read mode
- read the text from file and print on the screen
- close the file

**Source Code:**

Program1506.c
---------------

ID: 24G1A0571
---------------

2022-2026-CSF-B
-----------------

Srinivasa Ramanujan Institute of Technology

Page No: 177
--------------

```

#include <stdio.h>
#include <string.h>
void stringReverse(char[]);
void main()
{
    FILE *fp;
    int num, i;
    char ch, data[100];
    fp = fopen("TestDataFile3.txt", "w+");
    printf("Enter the text with @ at end : ");
    while ((ch = getchar()) != '@')
    {
        putc(ch, fp);
    }
    putc(ch, fp);
    printf("Enter number of characters to copy : ");
    scanf("%d", &num);
    i = 0;
    rewind(fp);
    while (i < num)
    {
        data[i] = getc(fp);
        i++;
    }
    data[i] = '\0';
    rewind(fp);
    stringReverse(data);
    fputs(data, fp);
    fclose(fp);
    fp = fopen("TestDataFile3.txt", "r");
    printf("Result is : ");
    while ((ch = getc(fp)) != '@')
    {
        putchar(ch);
    }
    printf("\n");
    fclose(fp);
}

void stringReverse(char data[100])
{
    int i, j;
    char temp;
    i = j = 0;
    while (data[j] != '\0')
    {
        j++;
    }
    j--;
    while (i < j)
    {
        temp = data[i];
        data[i] = data[j];
        data[j] = temp;
        i++;
        j--;
    }
}

```

```
}
```

```
}
```

## Execution Results - All test cases have succeeded!

Test Case - 1	
<b>User Output</b>	
Enter the text with @ at end :	
Teaching is a	
very noble profession that shapes the	
character, caliber and future of an individual@	
Enter number of characters to copy :	
18	
Result is : yrev	
a si gnihcaeT noble profession that shapes the	
character, caliber and future of an individual	

ID: 224G1A0571 Page No: 179

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

Test Case - 2	
<b>User Output</b>	
Enter the text with @ at end :	
Small aim	
is a crime; have great aim@	
Enter number of characters to copy :	
11	
Result is : i	
mia llamSs a crime; have great aim	

S.No: 34

Exp. Name: **Write a C program to Append data to an existing File**

Date: 2023-06-24

**Aim:**

Write a program to **append** data to an existing file and **display** its contents.

- open a new file "[DemoTextFile1.txt](#)" in write mode
- write the content onto the file
- close the file
- open a new same file in append mode
- write the content onto the file
- close the file
- open the same file in read mode
- read the text from file and print them on the screen
- close the file

**Source Code:**

appendDataToFile.c

```
#include <stdio.h>
void main()
{
    FILE *fp;
    char ch;
    fp = fopen("DemoTextFile1.txt", "w");
    printf("Enter the text with @ at end : ");
    while ((ch = getchar()) != '@')
    {
        putc(ch, fp);
    }
    fclose(fp);
    fp = fopen("DemoTextFile1.txt", "a");
    printf("Enter the text to append to a file with @ at end : ");
    while ((ch = getchar()) != '@')
    {
        putc(ch, fp);
    }
    putc(ch, fp);
    fclose(fp);
    fp = fopen("DemoTextFile1.txt", "r");
    printf("File content after appending : ");
    while ((ch = getc(fp)) != '@')
    {
        putchar(ch);
    }
    printf("\n");
    fclose(fp);
}
```

ID: 224G1A0571 Page No: 180

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

**Execution Results** - All test cases have succeeded!

Test Case - 1

**User Output**

Enter the text with @ at end :

I am studying@

Enter the text to append to a file with @ at end :

Life skills in University@

File content after appending : I am studying

Life skills in University

**Test Case - 2****User Output**

Enter the text with @ at end :

CodeTantra

developed@

Enter the text to append to a file with @ at end :

an interactive tool

to learn Programming@

File content after appending : CodeTantra

developed

an interactive tool

to learn Programming

Page No: 181

ID: 224G1A0571

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

S.No: 35	Exp. Name: <b><i>Write a C program to Count number of Characters, Words and Lines of a given File</i></b>	Date: 2023-06-24
----------	---	------------------

**Aim:**

Write a program to count number of **characters**, **words** and **lines** of given text file.

- open a new file "DemoTextField2.txt" in write mode
- write the content onto the file
- close the file
- open the same file in read mode
- read the text from file and find the characters, words and lines count
- print the counts of characters, words and lines
- close the file

**Source Code:**

countCharWordLines.c

```
#include <stdio.h>
void main()
{
    FILE *fp;
    char ch;
    int charCount = 0, wordCount = 0, lineCount = 0;
    fp = fopen("DemoTextField2.txt", "w");
    printf("Enter the text with @ at end : ");
    while ((ch = getchar()) != '@')
    {
        putc(ch, fp);
    }
    putc(ch, fp);
    fclose(fp);
    fp = fopen("DemoTextField2.txt", "r");
    do
    {
        if ((ch == ' ') || (ch == '\n') || (ch == '@'))    wordCount++;
        else    charCount++;
        if (ch == '\n' || ch == '@')    lineCount++;
    }
    while ((ch = getc(fp)) != '@');

    fclose(fp);
    printf("Total characters : %d\n", charCount);
    printf("Total words : %d\n", wordCount);
    printf("Total lines : %d\n", lineCount);
}
```

ID: 224G1A0571 Page No: 182

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

**Execution Results - All test cases have succeeded!**

Test Case - 1
<b>User Output</b>
Enter the text with @ at end : Arise! Awake!

and stop not until
the goal is reached@
Total characters : 43
Total words : 10
Total lines : 3

<b>Test Case - 2</b>
<b>User Output</b>
Enter the text with @ at end :
All power is with in you
you can do anything
and everything@
Total characters : 48
Total words : 12
Total lines : 3

ID: 24G1A0571 Page No: 183

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

**S.No: 36**

Exp. Name: ***Linked list Female gender first***

**Date: 2023-06-24**

**Aim:**

Consider a linked list consisting of name of a person and gender as a node. Arrange the linked list using 'Ladies first' principle. You may create new linked lists if necessary.

Note: Add node at the beginning.

**Source Code:**

rearrangeList.c

ID: 224G1A0571 Page No: 184

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

```

#include <stdio.h>
#include <stdlib.h>
#include <string.h>
struct Node
{
    int data;
    char name[20];
    char gender;
    struct Node *next;
};
void segregateEvenOdd(struct Node **head_ref)
{
    struct Node *end = *head_ref;
    struct Node *prev = NULL;
    struct Node *curr = *head_ref;
    while (end->next != NULL)
        end = end->next;
    struct Node *new_end = end;
    while (curr->data %2 != 0 && curr != end)
    {
        new_end->next = curr;
        curr = curr->next;
        new_end->next->next = NULL;
        new_end = new_end->next;
    }
    if (curr->data%2 == 0)
    {
        *head_ref = curr;
        while (curr != end)
        {
            if ( (curr->data)%2 == 0 )
            {
                prev = curr;
                curr = curr->next;
            }
            else
            {
                prev->next = curr->next;
                curr->next = NULL;
                new_end->next = curr;
                new_end = curr;
                curr = prev->next;
            }
        }
    }
    else
        prev = curr;
    if (new_end!=end && (end->data)%2 !=
0)
    {
        prev->next = end->next;
        end->next = NULL;
        new_end->next = end;
    }
    return;
}

```

ID: 224G1A0571 Page No: 185

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

```

head_ref, char new_name[20], char new_gender)
{
    struct Node*
new_node = (struct Node*) malloc(sizeof(struct Node));
    strcpy(new_node-
>name, new_name);

new_gender;
    if (new_gender ==
'F')
== 'M')   new_node->data  = 1;
(*head_ref);
new_node;
}
void
printList(struct Node *node)
{
    while
(node!=NULL)
    {
printf("%s (%c)", node->name, node->gender);
    node
= node->next;
    if
(node!=NULL)  printf(" --> ");
    }
}
int
main()
{
    struct Node* head = NULL;

char name[20];

char gender;

int noOfInputs, i;

int option;

printf("Insert Data\n");

do
{
    printf("Enter Name: ");

scanf(" %s", name);

```

ID: 24G1A0571 Page No: 186

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

```

scanf(" %c", &gender);

push(&head, name, gender);

printf("1 : Insert into Linked List\n");

printf("0 : Exit\n");

printf("Enter your option: ");

scanf(" %d", &option);

}

while(option == 1);

printf("Original Linked list \n");

printList(head);

segregateEvenOdd(&head);

printf("\nModified Linked list \n");

printList(head);

printf("\n");

return 0;

}

```

ID: 224G1A0571 Page No: 187

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

### Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Insert Data
Enter Name:
Ganga
Enter Gender:
F
1 : Insert into Linked List
0 : Exit
Enter your option:
1
Enter Name:
Yamuna
Enter Gender:
F
1 : Insert into Linked List

0 : Exit
Enter your option:
1
Enter Name:
Raj
Enter Gender:
M
1 : Insert into Linked List
0 : Exit
Enter your option:
1
Enter Name:
Veer
Enter Gender:
M
1 : Insert into Linked List
0 : Exit
Enter your option:
1
Enter Name:
Narmada
Enter Gender:
F
1 : Insert into Linked List
0 : Exit
Enter your option:
1
Enter Name:
Amar
Enter Gender:
M
1 : Insert into Linked List
0 : Exit
Enter your option:
0
Original Linked list
Amar (M) --> Narmada (F) --> Veer (M) --> Raj (M) --> Yamuna (F) --> Ganga (F)
Modified Linked list
Narmada (F) --> Yamuna (F) --> Ganga (F) --> Amar (M) --> Veer (M) --> Raj (M)

ID: 224G1A0571 Page No: 188

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

### Test Case - 2

<b>User Output</b>
Insert Data
Enter Name:
Ganga
Enter Gender:
F
1 : Insert into Linked List

0 : Exit
Enter your option:
1
Enter Name:
Yamuna
Enter Gender:
F
1 : Insert into Linked List
0 : Exit
Enter your option:
1
Enter Name:
Narmada
Enter Gender:
F
1 : Insert into Linked List
0 : Exit
Enter your option:
0
Original Linked list
Narmada (F) --> Yamuna (F) --> Ganga (F)
Modified Linked list
Narmada (F) --> Yamuna (F) --> Ganga (F)

ID: 224G1A0571 Page No: 189

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

<b>Test Case - 3</b>	
<b>User Output</b>	
Insert Data	
Enter Name:	
Raj	
Enter Gender:	
M	
1 : Insert into Linked List	
0 : Exit	
Enter your option:	
1	
Enter Name:	
Veer	
Enter Gender:	
M	
1 : Insert into Linked List	
0 : Exit	
Enter your option:	
1	
Enter Name:	
Amar	
Enter Gender:	
M	
1 : Insert into Linked List	

0 : Exit
Enter your option:
0
Original Linked list
Amar (M) --> Veer (M) --> Raj (M)
Modified Linked list
Amar (M) --> Veer (M) --> Raj (M)

ID: 224G1A0571 Page No: 190

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

**S.No: 37**

Exp. Name: ***Indexing of a file***

**Date: 2023-07-11**

**Aim:**

Write a C program to illustrate **Indexing of a file**.

Take an array of integers and find whether the given integer is present or not using **file indexing** method and print the output as shown in the sample output.

**Source Code:**

```
fileIndexing.c
```

ID: 224G1A0571 Page No: 191

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

```

#include <stdio.h>
#define MAX 25
struct indexfile
{
    int indexId;
    int kIndex;
};
int main()
{
    int numbers[MAX];
    struct indexfile index[MAX];
    int i, num, low, high, br = 4;
    int noOfStudents;
    printf("How many numbers do you want to enter:");
    scanf(" %d", &noOfStudents);
    printf("Enter %d numbers:", noOfStudents);
    for (i = 0; i < noOfStudents; i++)
    {
        scanf("%d", &numbers[i]);
    }
    for (i = 0; i < (noOfStudents / 5); i++)
    {
        index[i].indexId = numbers[br];
        index[i].kIndex = br;
        br = br + 5;
    }
    printf("Enter a number to search:");
    scanf("%d", &num);
    for (i = 0; (i < noOfStudents / 5) && (index[i].indexId <= num); i++)
    if(i != 0)
        low = index[i - 1].kIndex;
    else
        low = 0;
    if(index[i].kIndex != 0 && index[i].kIndex <= noOfStudents)
        high = index[i].kIndex;
    else
        high = noOfStudents;
    for (i = low; i <= high; i++)
    {
        if (num == numbers[i])
        {
            printf("Number found at position:%d", i);
            return 0;
        }
    }
    printf("\nNumber not found."); return 0;
}

```

ID: 224G1A0571 Page No: 192

2022-2026-CSE-B

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### Execution Results - All test cases have succeeded!

Test Case - 1
---------------

**User Output**

How many numbers do you want to enter:

5

Enter 5 numbers:

1 5 6 9 12

Enter a number to search:

6

Number found at position:2

**Test Case - 2****User Output**

How many numbers do you want to enter:

7

Enter 7 numbers:

2 3 6 9 12 20 25

Enter a number to search:

20

Number found at position:5

ID: 24G1A0571 Page No: 193

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

S.No: 38	Exp. Name: <b><i>Write a C program to Convert an Infix expression into Postfix expression</i></b>	Date: 2023-07-11
----------	---	------------------

**Aim:**

Write a program to convert an [infix](#) expression into [postfix](#) expression.

**Source Code:**

```
Infix2PostfixMain.c
```

ID: 224G1A0571 Page No: 194

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

```

#include<stdlib.h>
#include<string.h>
#include<stdio.h>
#include<ctype.h>
#define STACK_MAX_SIZE 20
char stack [STACK_MAX_SIZE];
int top = -1;
//Return 1 if stack is empty else return 0.
int isEmpty()
{
    if(top<0)
        return 1;
    else
        return 0;
}
//Push the character into stack
void push(char x)
{
    if(top == STACK_MAX_SIZE - 1)
    {
        printf("Stack is overflow.\n");
    }
    else
    {
        top = top + 1;
        stack[top] = x;
    }
}
//pop a character from stack
char pop()
{
    if(top < 0)
    {
        printf("Stack is underflow : unbalanced parenthesis\n");
        exit(0);
    }
    else
    {
        return
        stack[top--];
    }
}
// Return 0 if char is '('
// Return 1 if char is '+' or '-'
// Return 2 if char is '*' or '/' or '%'
int priority(char x)
{
    if(x == '(')
        return 0;
    if(x == '+' || x == '-')
        return 1;
    if(x == '*' || x == '/' || x == '%')
        return 2;
}
//Output Format
//if expression is correct then output will be Postfix Expression : <postfix notation>
//If expression contains invalid operators then output will be "Invalid symbols in infix

```

```

//If the expression contains unbalanced parenthesis the output will be "Invalid infix
expression :
//unbalanced parenthesis."
void convertInfix(char * e)
{
    int x;
    int k=0;
    char * p = (char *)malloc(sizeof(char)*strlen(e));
    while(*e != '\0')
    {
        if(isalnum(*e))
            p[k++]=*e;
        else if(*e == '(')
            push(*e);
        else if(*e == ')')
        {
            while(!isEmpty() && (x = pop()) != '(')
                p[k++]=x;
        }
        else if (*e == '+' || *e == '-' || *e == '*' || *e == '/' || *e == '%')
        {
            while(priority(stack[top]) >= priority(*e))
                p[k++]=pop();
            push(*e);
        }
        else
        {
            printf("Invalid symbols in infix expression. Only alphanumeric and {
'+', '-','*', '%', '/', } are allowed.\n");
            exit(0);
        }
        e++;
    }
    while(top != -1)
    {
        x=pop();
        if(x == '(')
        {
            printf("Invalid infix expression : unbalanced parenthesis.\n");
            exit(0);
        }
        p[k++] = x;
    }
    p[k++]='\0';
    printf("Postfix expression : %s\n",p);
}
int main()
{
    char exp[20];
    char *e, x;
    printf("Enter the expression : ");
    scanf("%s",exp);
    e = exp;
    convertInfix(e);
}

```

## Execution Results - All test cases have succeeded!

Test Case - 1
<b>User Output</b>
Enter the expression :
A+B*(C-D)
Postfix expression : ABCD-*+

Test Case - 2
<b>User Output</b>
Enter the expression :
A+B*C
Postfix expression : ABC*+

ID: 24G1A0571 Page No: 197

2022-2026-CSE-B

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**S.No: 39**

Exp. Name: ***Infix to Prefix Conversion***

**Date: 2023-06-26**

**Aim:**

Write a C program to convert an Infix expression to Prefix expression.

**Source Code:**

infixToPrefix.c

ID: 224G1A0571 Page No: 198

2022-2026-CSE-B

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```

#define SIZE 50
#include<string.h>
#include <ctype.h>
#include<stdio.h>
char *strrev(char *str)
{
    char c, *front, *back;
    if(!str || !*str)
    {
        return str;
    }
    for(front=str,back=str+strlen(str)-1;front < back;front++,back--)
    {
        c=*front;
        *front=*back;
        *back=c;
    }
    return str;
}
char s[SIZE];
int top = -1;
void push (char elem)
{
    s[++top] = elem;
}
char pop ()
{
    return (s[top--]);
}
int pr (char elem)
{
    switch (elem)
    {
        case '#':
            return 0;
        case ')':
            return 1;
        case '+':
        case '-':
            return 2;
        case '*':
        case '/':
            return 3;
    }
}
void main ()
{
    char infix[50], prefix[50], ch,
elem;
    int i = 0, k = 0;
    printf ("Enter Infix
Expression:");
    scanf ("%s", infix);
    push ('#');
    strrev (infix);

```

ID: 224G1A0571 Page No: 199

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

```

    {
        if (ch == ')')
            push (ch);
        else if (isalnum
(ch))
(s[top] != ')')
prfx[k++] = pop ();
= pop ();
}

while (pr (s[top]) >= pr (ch))
{
    prfx[k++] = pop ();
}
push (ch);
}
}

while (s[top] != '#')
{
    prfx[k++] = pop ();
}
prfx[k] = '\0';
strrev (prfx);
strrev (infx);
printf ("Prefix Expression:%s\n", prfx);
}

```

ID: 224G1A0571 Page No: 200

2022-2026-CSE-B

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## Execution Results - All test cases have succeeded!

Test Case - 1
<b>User Output</b>
Enter Infix Expression:
A+B
Prefix Expression:+AB

Test Case - 2
<b>User Output</b>
Enter Infix Expression:
A/B+C/D
Prefix Expression:+/AB/CD

ID: 224G1A0571 Page No: 201

2022-2026-CSE-B

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**S.No: 40**

Exp. Name: ***Postfix to Infix Conversion***

**Date: 2023-07-11**

**Aim:**

Write a C program to convert a Postfix expression to Infix expression.

**Source Code:**

postfixToInfix.c

ID: 224G1A0571 Page No: 202

2022-2026-CSE-B

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```

#include<stdio.h>
#include<conio.h>
#include<string.h>
#include<stdlib.h>
#define MAX 20
char str[MAX],stack[MAX];
int top=-1;
void push(char c)
{
    stack[++top]=c;
}
char pop()
{
    return stack[top--];
}
char *strrev(char *str)
{
    char c, *front, *back;
    if(!str || !*str)
        return str;
    for(front=str,back=str+strlen(str)-1;
        front < back;
        front++,back--)
    {
        c=*front;*front=*back;*back=c;
    }
    return str;
}
void postfix()
{
    int n,i,j=0;
    char a,b,op,x[20];
    printf("Enter a Postfix expression:");
    fflush(stdin);
    scanf("%s", str);
    strrev(str);
    n=strlen(str);
    for(i=0;i<MAX;i++)
    {
        stack[i]='\0';
    }
    printf("Infix expression:");
    for(i=0;i<n;i++)
    {
        if(str[i]=='+'||str[i]=='-'||str[i]=='*'||str[i]=='/')
        {
            push(str[i]);
        }
        else
        {
            x[j]=str[i]; j++;
            x[j]=pop(); j++;
        }
    }
}

```

```
    strrev(x);
    printf("%s\n",x);
}
void main()
{
    postfix();
}
```

### Execution Results - All test cases have succeeded!

Test Case - 1
<b>User Output</b>
Enter a Postfix expression:
AB+
Infix expression:A+B

ID: 224G1A0571 Page No: 204

Test Case - 2
<b>User Output</b>
Enter a Postfix expression:
ABC*D+
Infix expression:A+B*C+D

2022-2026-CSE-B

**S.No: 41**

Exp. Name: ***Prefix to Infix Conversion***

**Date: 2023-07-11**

**Aim:**

Write a C program to convert a Prefix expression to Infix expression.

**Source Code:**

prefixToInfix.c

ID: 24G1A0571 Page No: 205

2022-2026-CSE-B

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```

#include<stdio.h>
#include<conio.h>
#include<string.h>
#include<stdlib.h>
#define MAX 20
char str[MAX],stack[MAX];
int top=-1;
void push(char c)
{
    stack[++top]=c;
}
char pop()
{
    return stack[top--];
}
void prefix()
{
    int n,i;
    char a,b,op;
    printf("Enter a Prefix expression:");
    fflush(stdin);
    scanf("%s", str);
    n=strlen(str);
    for(i=0;i<MAX;i++)
    {
        stack[i]='\0';
    }
    printf("Infix expression:");
    for(i=0;i<n;i++)
    {
        if(str[i]=='+'||str[i]=='-'||str[i]=='*'||str[i]=='/')
        {
            push(str[i]);
        }
        else
        {
            op=pop();
            a=str[i];
            if(op == '\0')
            {
                printf("%c",a);
            }
            else
            {
                printf("%c%c",a,op);
            }
        }
    }
    if(top >= 0)
    {
        printf("%c\n",str[top--]);
    }
    else
    {
        printf("\n");
    }
}

```

```
}

void main()
{
    prefix();
}
```

### Execution Results - All test cases have succeeded!

Test Case - 1
<b>User Output</b>
Enter a Prefix expression:
+AB
Infix expression:A+B

ID: 24G1A0571 Page No: 207

Test Case - 2
<b>User Output</b>
Enter a Prefix expression:
+/AB/CD
Infix expression:A/B+C/D

2022-2026-CSE-B

**S.No: 42**

Exp. Name: ***Postfix to Prefix Conversion***

**Date: 2023-07-11**

**Aim:**

Write a C program to convert a Postfix expression to Prefix expression.

**Source Code:**

```
postfixToPrefix.c
```

ID: 224G1A0571 Page No: 208

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

```

#include<stdio.h>
#include<conio.h>
#include<string.h>
#include<stdlib.h>
# define MAX 20
char *strrev(char *str)
{
    char c, *front, *back;
    if(!str || !*str)
        return str;
    for(front=str, back=str+strlen(str)-1;
        front < back; front++, back--)
    {
        c=*front;
        *front=*back;
        *back=c;
    }
    return str;
}
char str[MAX],stack[MAX];
int top=-1;
void push(char c)
{
    stack[++top]=c;
}

char pop()
{
    return stack[top--];
}

void post_pre()
{
    int n,i,j=0;
    char c[20];
    char a,b,op;
    printf("Enter the postfix expression:");
    scanf("%s", str);
    n=strlen(str);
    for(i=0;i<MAX;i++)
    stack[i]='\0';
    printf("Prefix expression is:");
    for(i=n-1;i>=0;i--)
    {
        if(str[i]=='+'||str[i]=='-'||str[i]=='*'||str[i]=='/')
        {
            push(str[i]);
        }
        else
        {
            c[j++]=str[i];
            while((top!=-1)&&(stack[top]=='@'))
            {
                a=pop(); c[j++]=pop();
            }
        }
    }
}

```

```
        }
        c[j]='\0';
        strrev(c);
        printf("%s\n",c);
    }
void main()
{
    post_pre();
}
```

### Execution Results - All test cases have succeeded!

Test Case - 1
<b>User Output</b>
Enter the postfix expression:
AB+
Prefix expression is:+AB

ID: 224G1A0571 Page No: 210

Test Case - 2
<b>User Output</b>
Enter the postfix expression:
ABC*D+
Prefix expression is:++A*BCD

2022-2026-CSE-B

**S.No: 43**

Exp. Name: ***Prefix to Postfix Conversion***

**Date: 2023-07-11**

**Aim:**

Write a C program to convert a Prefix expression to Postfix expression.

**Source Code:**

```
prefixToPostfix.c
```

ID: 224G1A0571 Page No: 211

2022-2026-CSE-B

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```

#include<stdio.h>
#include<conio.h>
#include<string.h>
#include<stdlib.h>
#define MAX 20
char str[MAX],stack[MAX];
int top=-1;
void push(char c)
{
    stack[++top]=c;
}
char pop()
{
    return stack[top--];
}
void pre_post()
{
    int n,i,j=0;
    char c[20];
    char a,b,op;
    printf("Enter a Prefix expression:");
    scanf("%s", str);
    n=strlen(str);
    for(i=0;i<MAX;i++)
        stack[i]='\0';
    printf("Postfix expression is:");
    for(i=0;i<n;i++)
    {
        if(str[i]=='+'||str[i]=='-'||str[i]=='*'||str[i]=='/')
        {
            push(str[i]);
        }
        else
        {
            c[j++]=str[i];
            while((top!=-1)&&(stack[top]=='@'))
            {
                a=pop(); c[j++]=pop();
            }
            push('@');
        }
    }
    c[j]='\0';
    printf("%s\n",c);
}
void main()
{
    pre_post();
}

```

ID: 224G1A0571 Page No: 212

2022-2026-CSE-B

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### Execution Results - All test cases have succeeded!

Test Case - 1

**User Output**

Enter a Prefix expression:

+AB

Postfix expression is:AB+

**Test Case - 2****User Output**

Enter a Prefix expression:

+/AB/CD

Postfix expression is:AB/CD/+

ID: 224G1A0571 Page No: 213

2022-2026-CSE-B

Srinivasa Ramanujan Institute of Technology

