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Experiment No.	5

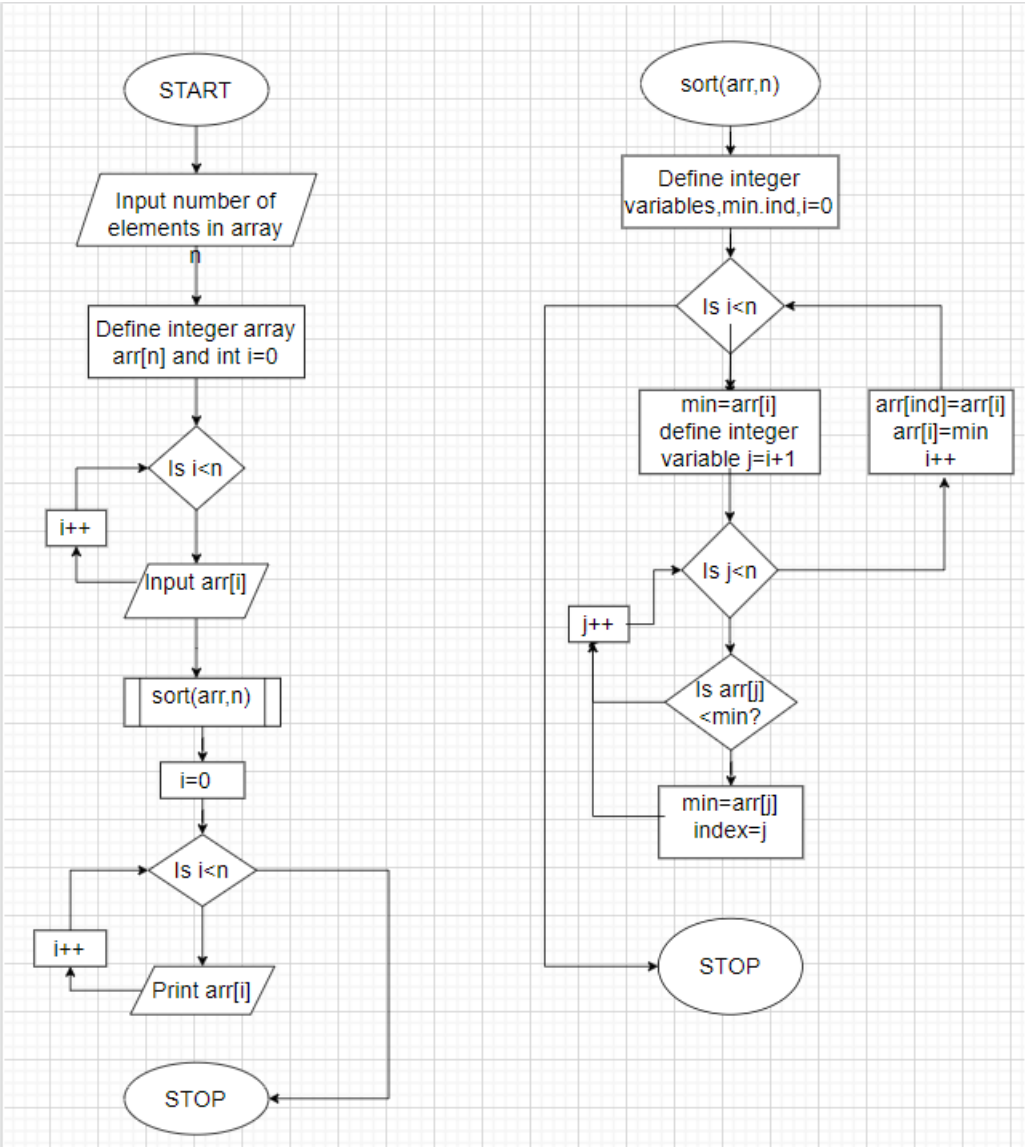
AIM:	Demonstrate the use of one-dimensional arrays to solve a given problem.
Program 1	

PROBLEM STATEMENT :	The selection sort algorithm sorts an array by repeatedly finding the minimum element (considering ascending order) from the unsorted part and putting it at the beginning. The algorithm maintains two sub-arrays in a given array.
	1) The sub-array which is already sorted.
	2) Remaining sub-array which is unsorted.
	Every iteration of selection sort, the minimum element (considering ascending order) from the unsorted sub-array is picked and moved to the sorted sub-array.
	Following example explains the above steps:
	arr[] = 64 25 12 22 11
	// Find the minimum element in arr[0...4]
	// and place it at beginning
	11 25 12 22 64
	// Find the minimum element in arr[1...4]
	// and place it at beginning of arr[1...4]
	11 12 25 22 64
	// Find the minimum element in arr[2...4]
	// and place it at beginning of arr[2...4]
	11 12 22 25 64
	// Find the minimum element in arr[3...4]
	// and place it at beginning of arr[3...4]
	11 12 22 25 64

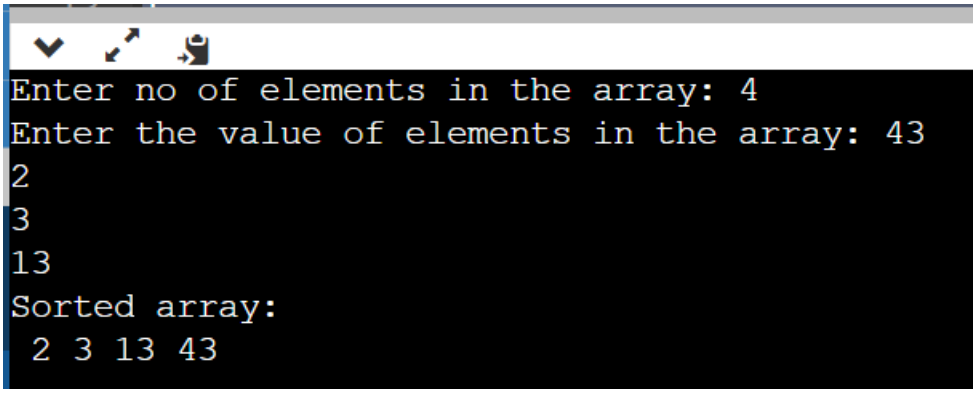
ALGORITHM:	1.START 2.Define function sort with integer array and integer parameter n 3.Define integer variables min,ind 4. for(i=0; i<n; i++) Min=arr[i]

	for(j=i+1; j<n; j++)
	5. if(min>arr[j])
	min=arr[j];
	ind = j;
	arr[ind]=arr[i];
	arr[i]=min
	
	6.Define function main
	7.Enter number of elements
	8.Input all elements in arr[n]
	9.Call function sort(arr, n)
	10.Print sorted array
	11.STOP

FLOWCHART:


START
Input number of elements in array
n
Define integer array arr[n] and int i=0
Is i<n
i++
Input arr[i]
sort(arr,n)
i=0
Is i<n
i++
Print arr[i]
STOP
sort(arr,n)
Define integer variables,min.ind,i=0
Is i<n
min=arr[i] define integer variable j=i+1
arr[ind]=arr[i] arr[i]=min i++
Is j<n
j++
Is arr[j] <min?
min=arr[j] index=j
STOP

PROGRAM:	#include<stdio.h>
	
	void sort(int arr[],int n)
	{
	int min,ind;
	for(int i=0;i<n;i++)
	{
	min = arr[i];
	for(int j=i+1;j<n;j++)
	{
	if(min>arr[j])
	{
	min=arr[j];
	ind = j;
	}
	}
	arr[ind]=arr[i];
	arr[i]=min;
	}
	}
	int main()
	{
	int n;
	printf("Enter no of elements in the array: ");
	scanf("%d",&n);
	int arr[n];
	printf("Enter the value of elements in the array: ");
	for(int i=0;i<n;i++)
	{
	scanf("%d",&arr[i]);
	}
	sort(arr,n);
	printf("Sorted array:\n ");
	for(int i=0;i<n;i++)
	{
	printf("%d ",arr[i]);
	}
	return 0;

	}
RESULT: 	

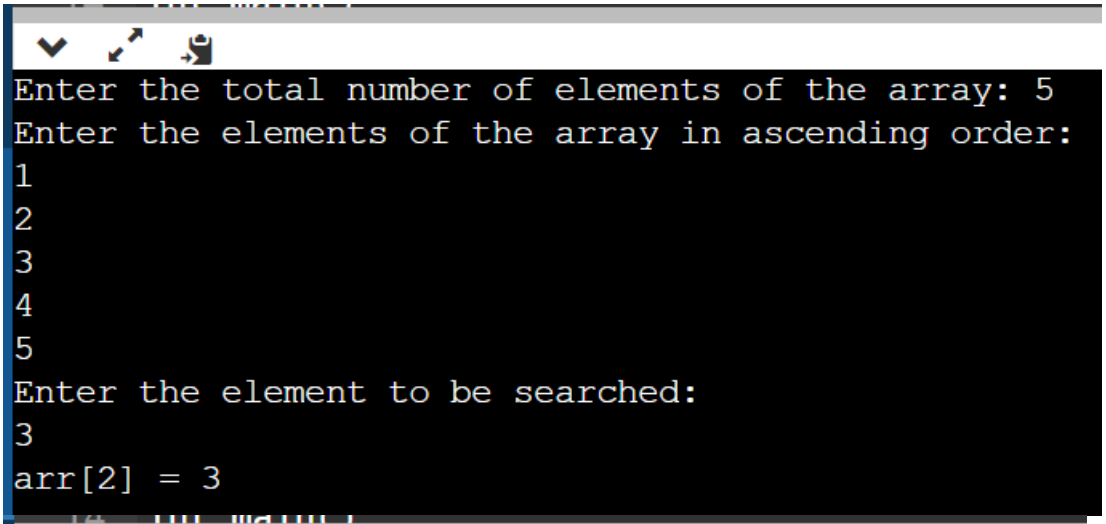
Program 2	
PROBLEM STATEMENT :	Perform search of a particular element on the above array using binary search. Binary Search will search a sorted array by repeatedly dividing the search interval in half. Begin with an interval covering the whole array. If the value of the search key is less than the item in the middle of the interval, narrow the interval to the lower half. Otherwise narrow it to the upper half. Repeatedly check until the value is found or the interval is empty. We basically ignore half of the elements just after one comparison. 1. Compare x with the middle element. 2. If x matches with middle element, we return the mid index. 3. Else If x is greater than the mid element, then x can only lie in right half subarray after the mid element. So we recur for right half. 4. Else (x is smaller) recur for the left half
ALGORITHM:	1.START 2.Define function void bin_srch with integer array and integer parameters size and num

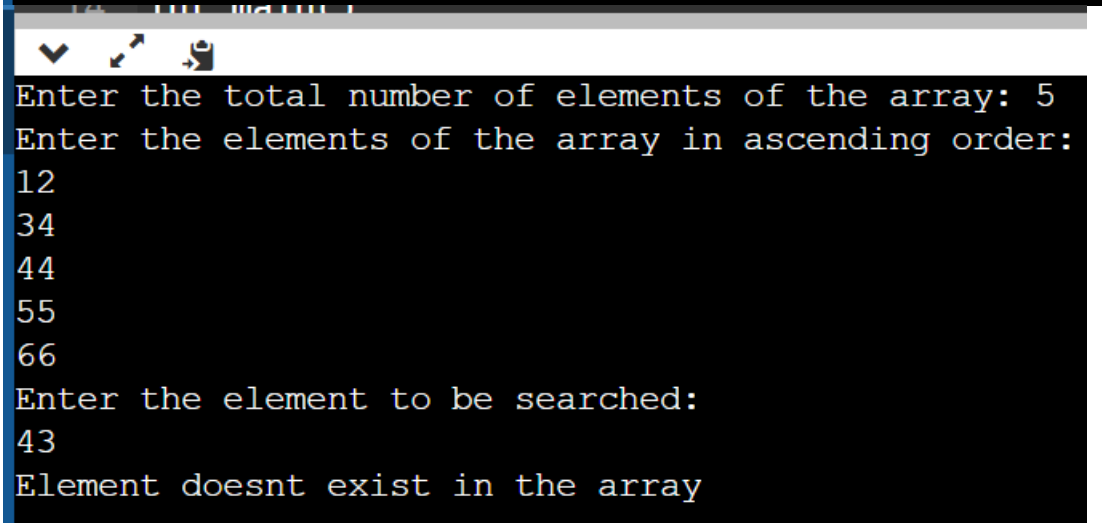
	3.Define integer variables hi,lo=0,i 4.for(i=(size/2); arr[i]!=num; i=((hi+lo)/2)) 5.if(arr[i]<num) Then lo = i+1 6.else if(arr[i]>num) Then hi = i-1 7.if(i==0 || i==size-1) Then break 8.if(arr[i]==num) Print arr[i]=i 9.else print element does not exist in array 10.Define function main 11.Define integer parameters numb and n 12.Input total number of elements of array 13.Input the elements of the array in an array in ascending order 14.Input the element to be searched 15.Call function bin_srch 16.STOP

PROGRAM:	#include <stdio.h>
	void bin_srch(int arr[80], int size, int num)
	{
	int hi=size-1, lo=0, i;
	for(i=(size/2); arr[i]!=num; i=((hi+lo)/2))
	{
	if(arr[i]<num){lo = i+1;}
	else if(arr[i]>num){hi = i-1;}
	if(i==0 || i==size-1){break;}
	}
	if(arr[i]==num){printf("arr[%d] = %d", i, arr[i]);}
	else{printf("Element doesnt exist in the array");}
	}
	int main()
	{
	int numb,n;

	printf("Enter the total number of elements of the array: ");
	scanf("%d",&n);
	int arr[n];
	printf("Enter the elements of the array in ascending order:\n");
	for(int i=0;i<n;i++)
	
	{
	scanf("%d",&arr[i]);
	}
	printf("Enter the element to be searched: \n");
	scanf("%d",&numb);
	bin_srch(arr,n,numb);
	return 0;}

RESULT:	





Program 3	
PROBLEM STATEMENT:	Circular Array Rotation means rotating the elements in the array where one rotation operation moves the first element of the array to the last position and shifts all remaining elements to the left. Here, we are given an unsorted array and our task is to perform the circular rotation by n number of rotations where n is a natural number. Initial Array: [1 2 3 4 5] After one rotation : [2 3 4 5 1] After two rotation : [3 4 5 1 2]
ALGORITHM:	1.START 2. Define function void circ() with integer array arr[] and two integer parameter m and n

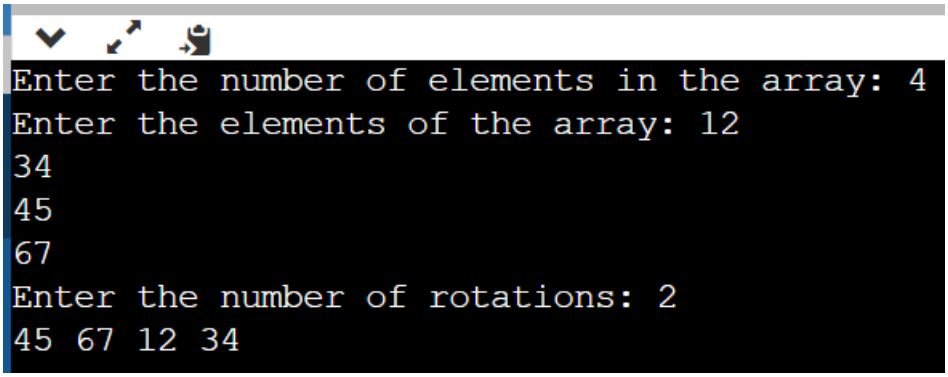
	3. for(i=1;i<=m;i++) Store the value of arr[0] in temp 4. for (int j = 0; j < n - 1; j++) arr[j] = arr[j + 1]; arr[n-1]=temp 5. Define function main() 6. Input no of elements in array n 7. Input the no. of rotations m 8. Input integer array arr[n] 9. Call function circ(arr,n,m) 10.STOP

PROGRAM:	#include<stdio.h>
	
	void circ(int arr[],int n,int m)
	{
	int temp,i,j;
	for(i=1;i<=m;i++)
	{
	temp = arr[0];
	for (int j = 0; j < n - 1; j++)
	{
	arr[j] = arr[j + 1];
	}
	arr[n-1]=temp;
	}
	
	for(int i=0;i<n;i++)
	{
	printf("%d ",arr[i]);
	}
	}
	int main()
	{
	int m,n;
	printf("Enter the number of elements in the array: ");
	scanf("%d",&n);
	int arr[n];
	printf("Enter the elements of the array: ");

```
for(int i=0;i<n;i++)
{
scanf("%d",&arr[i]);
}
printf("Enter the number of rotations: ");
scanf("%d",&m);
circ(arr,n,m);


return 0;
}
```

RESULT:



CONCLUSION: In the above experiment we learnt about 1 dimensional arrays. We learnt about their declaration and how to call it in a function as a parameter. We also learnt about bubble sort, binary search algorithms and how to rotate the elements of the array.