1. (i) (a) Write C programs that use recursive functions to perform Linear search for a Key value in a given list.

Program:

```
/* LINEAR SEARCH USING RECUSION */
int linearrec(int [],int,int,int);
void main()
{
int a[20],n,i,flag=0,ele;
clrscr();
printf("Enter number of element to array");
scanf("%d",&n);
printf("\n Enter elements to array");
for(i=0;i<n;i++)
{
scanf("%d",&a[i]);
}
printf("\n Enter element to search");
scanf("%d",&ele);
flag=linearrec(a,n,ele,0);
if(flag==1)
{
printf("\n Successful search");
}
else
{
printf("\n The given element was not found in the array");
}
getch();
}
int linearrec(int a[],int n,int ele,int i)
{
if(i<n)
{
if(a[i]==ele)
{
printf("\n Element found at %d location",i);
return 1;
}
else
{
i=i+1;
linearrec(a,n,ele,i);
}
}
}
```

Output:

```
Enter number of element to array 5
Enter elements to array
10 2 20 3 11
```

```
Enter element to search 2
Element found at 1 location
Successful search
Enter number of element to array 6
Enter elements to array
12 36 14 10 2 6
Enter element to search
42
The given element was not found in the array
```

(i) (b) Write C programs that use non recursive functions to perform Linear search for a Key value in a given list.

Program:

```
/* LINEAR SEARCH USING NON RECUSION */
int linear(int [],int,int);
void main()
{
int a[20],n,i,flag=0,ele;
clrscr();
printf("Enter number of element to array");
scanf("%d",&n);
printf("\n Enter elements to array");
for(i=0;i<n;i++)
{
scanf("%d",&a[i]);
}
printf("\n Enter element to search");
scanf("%d",&ele);
flag=linear(a,n,ele);
if(flag!=0)
{
printf("\n Successful search");
}
else
{
printf("\n The given element was not found in the array");
}
getch();
}
int linear(int a[],int n,int ele)
{
int i;
for(i=0;i<n;i++)
{
if(a[i]==ele)
{
printf("\n Element found at %d location",i);
return 1;
```

```
}
}
return 0;
}
```
Output:
```
Enter number of element to array 6
Enter elements to array
15 22 10 3 4 6
Enter element to search 10
Element found at 2 location
Successful search
Enter number of element to array 5
Enter elements to array
1 6 4 3 7
Enter element to search 10
The given element was not found in the array
```

1. (ii) (a) Write C programs that use cursive functions to perform Binary search for a Key value in a given list.

Program:
```
/* BINARY SEARCH USING RECUSION */
int binaryrec(int [],int,int,int,int);
void main()
{
int a[20],n,i,flag=0,ele;
clrscr();
printf("Enter number of element to array");
scanf("%d",&n);
printf("\n Enter elements to array");
for(i=0;i<n;i++)
{
scanf("%d",&a[i]);
}
printf("\n Enter element to search");
scanf("%d",&ele);
flag=binaryrec(a,n,ele,0,n-1);
if(flag==1)
{
printf("\n Successful search");
}
else
{
printf("\n The given element was not found in the array");
}
getch();
}
```

```
int binaryrec(int a[],int n,int ele,int first,int last)
{
int mid;
if(first<=last)
{
mid=(first+last)/2;
if(ele==a[mid])
{
printf("\n The given element was found at %d location",mid);
return 1;
}
else if(ele<a[mid])
{
binaryrec(a,n,ele,first,mid-1);
}
else if(ele>a[mid])
{
binaryrec(a,n,ele,mid+1,last);
}
}
}
```

Output:

```
Enter number of element to array 5
Enter elements to array
22 33 44 55 66
Enter element to search
33
The given element was found at 1 location
Successful search
Enter number of element to array 6
Enter elements to array
10 20 112 123 145 368
Enter element to search 23
The given element was not found in the array
```

1. (ii) (b) Write C programs that non recursive functions to perform Binary search for a Key value in a given list.

Program:

```
/* BINARY SEARCH USING NON RECUSION */
int binarysearch(int [],int,int);
void main()
{
int a[20],n,i,flag=0,ele;
clrscr();
printf("Enter number of element to array");
scanf("%d",&n);
printf("\n Enter elements to array");
for(i=0;i<n;i++)
{
scanf("%d",&a[i]);
```

```
}
printf("\n Enter element to search");
scanf("%d",&ele);
flag=binarysearch(a,n,ele);
if(flag!=0)
{
printf("\n Successful search");
}
else
{
printf("\n The given element was not found in the array");
}
getch();
}
int binarysearch(int a[],int n,int ele)
{
int first,last,mid;
first=0;
last=n-1;
while(first<=last)
{
mid=(first+last)/2;
if(ele==a[mid])
{
printf("\n The given element was found at %d location",mid);
return 1;
}
else if(ele<a[mid])
{
last=mid-1;
}
else if(ele>a[mid])
{
first=mid+1;
}
}
return 0;
}
```

Output:

```
Enter number of element to array 5
Enter elements to array
12 15 17 18 25
Enter element to search18
The given element was found at 3 location
Successful search
Enter number of element to array 4
Enter elements to array
1 2 10 15
Enter element to search 22
The given element was not found in the array
```