

PROGRAM CODE

```
/* Program to implement insertion sort using C programming language */
#include<stdio.h>
#include<conio.h>

int main(){
    int size;
    printf("Enter the size of the array : ");
    scanf("%d",&size);
    int i, j, arr[size], small;
    printf("Enter %d numbers which are to be sorted : ", size);
    for(i=0; i<size; i++)
        scanf("%d", &arr[i]);

    for(i=1; i<size; i++){
        small = arr[i];
        for(j=i-1; j>=0 && arr[j]>small; j--)
            arr[j+1] = arr[j];
        arr[j+1] =small;
    }

    printf("The sorted numbers are : ");
    for(i=0; i<size; i++)
        printf("%d  ", arr[i]);
}
```

OUTPUT

1.

Enter the size of the array : 9

Enter 9 numbers which are to be sorted : 12 23 25 165 56 255 97 98 565

The sorted numbers are : 12 23 25 56 97 98 165 255 565

2.

Enter the size of the array : 10

Enter 10 numbers which are to be sorted : 584 49 514 9 966 59 65 487 458 32

The sorted numbers are : 9 32 49 59 65 458 487 514 584 966

PROGRAM CODE

```
/* Program to implement merge sort using C programming language */
#include<stdio.h>
#include<conio.h>

void merge(int [], int [], int, int, int);
void msort(int [], int [], int , int);

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

    int i, j, arr[size], small, temp[size];
    printf("Enter %d numbers which are to be sorted : ", size);
    for(i=0; i<size; i++)
        scanf("%d", &arr[i]);

    msort(arr, temp, 0, size-1);

    printf("The sorted numbers are : ");
    for(i=0; i<size; i++)
        printf("%d ", arr[i]);
}

void msort(int arr[], int temp[], int left, int right){
    int mid;
    if(left < right){
        mid = (left + right) / 2;
        msort(arr, temp, left, mid);
        msort(arr, temp, mid+1, right);
        merge(arr, temp, left, mid+1, right);
    }
}

void merge(int arr[], int temp[], int left, int mid, int right){
    int i, lend, no_element, tmpos;
    lend = mid - 1;
    tmpos = left;
    no_element = right - left + 1;
    while ((left <= lend) && (mid <= right)){
        if(arr[left] <= arr[mid]){
            temp[tmpos] = arr[left];
            tmpos++;
            left++;
        }
        else{
            temp[tmpos] = arr[mid];
            tmpos++;
            mid++;
        }
    }
}
```

```

while (left <= lend){
    temp[tmpos] = arr[left];
    left++;
    tmpos++;
}
while ((mid <= right)){
    temp[tmpos] = arr[mid];
    mid ++;
    tmpos ++;
}
for(i=0; i<=no_element; i++){
    arr[right] = temp[right];
    right --;
}
}

```

OUTPUT

1.

Enter the size of the array : 10

Enter 10 numbers which are to be sorted : 65 459 64 23 52 589 2510 46 4 146

The sorted numbers are : 4 23 46 52 64 65 146 459 589 2510

2.

Enter the size of the array : 9

Enter 9 numbers which are to be sorted : 54 4518 545 12 46 236 10 320 124

The sorted numbers are : 10 12 46 54 124 236 320 545 4518

PROGRAM CODE

```
/* Program to implement binary search in C programming language */
#include<stdio.h>
#include<conio.h>

void binsrch(int [], int, int, int);

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

    int i, j, item, arr[size], small;
    char ch;
    printf("Enter %d numbers to implement binary search : ", size);
    for(i=0; i<size; i++)
        scanf("%d", &arr[i]);

    for(i=1; i<size; i++){
        small = arr[i];
        for(j=i-1; j>=0 && arr[j]>small; j--)
            arr[j+1] = arr[j];
        arr[j+1] = small;
    }

    printf("The sorted numbers are : ");
    for(i=0; i<size; i++)
        printf("%d ", arr[i]);
    printf("\n");
    do{
        printf("\nEnter no. to be searched : ");
        scanf("%d", &item);
        binsrch(arr, 0, size, item);
        fseek(stdin, 0, SEEK_END);
        printf("Do you want to search for another number (Y/N)? : ");
        scanf("%c", &ch);
    }
    while ((ch == 'Y') || (ch == 'y'));
}

void binsrch(int arr[], int beg, int end, int item){
    int mid, count=1;
    mid = (beg+end)/2;
    while(beg<=end && item != arr[mid]){
        if(item < arr[mid])
            end =mid-1;
        else
            beg=mid+1;
        mid=(beg+end)/2;
        count++;
    }
    if(item==arr[mid]){
        printf("Search successful!!! \n ");
    }
}
```

```

        printf("It took %d iterations to find this item", count);
        printf("\n The position is %d \n\n",mid+1);
    }
    else
        printf("Search unsuccessful!!! \n\n");
}

```

OUTPUT

Enter the size of the array : 10

Enter 10 numbers to implement binary search : 210 15 164 48 494 89 97 12 1 4850

The sorted numbers are : 1 12 15 48 89 97 164 210 494 4850

Enter no. to be searched : 89

Search successful!!!

It took 4 iterations to find this item

The position is 5

Do you want to search for another number (Y/N)? : y

Enter no. to be searched : 97

Search successful!!!

It took 1 iterations to find this item

The position is 6

Do you want to search for another number (Y/N)? : y

Enter no. to be searched : 40

Search unsuccessful!!!

Do you want to search for another number (Y/N)? : y

Enter no. to be searched : 4850

Search successful!!!

It took 3 iterations to find this item

The position is 10

Do you want to search for another number (Y/N)? : n