LAB PROGRAM 12

Write a program

a) To construct a Binary Search Tree.

b) To traverse the tree using all the methods, i.e., in order, pre order and post order

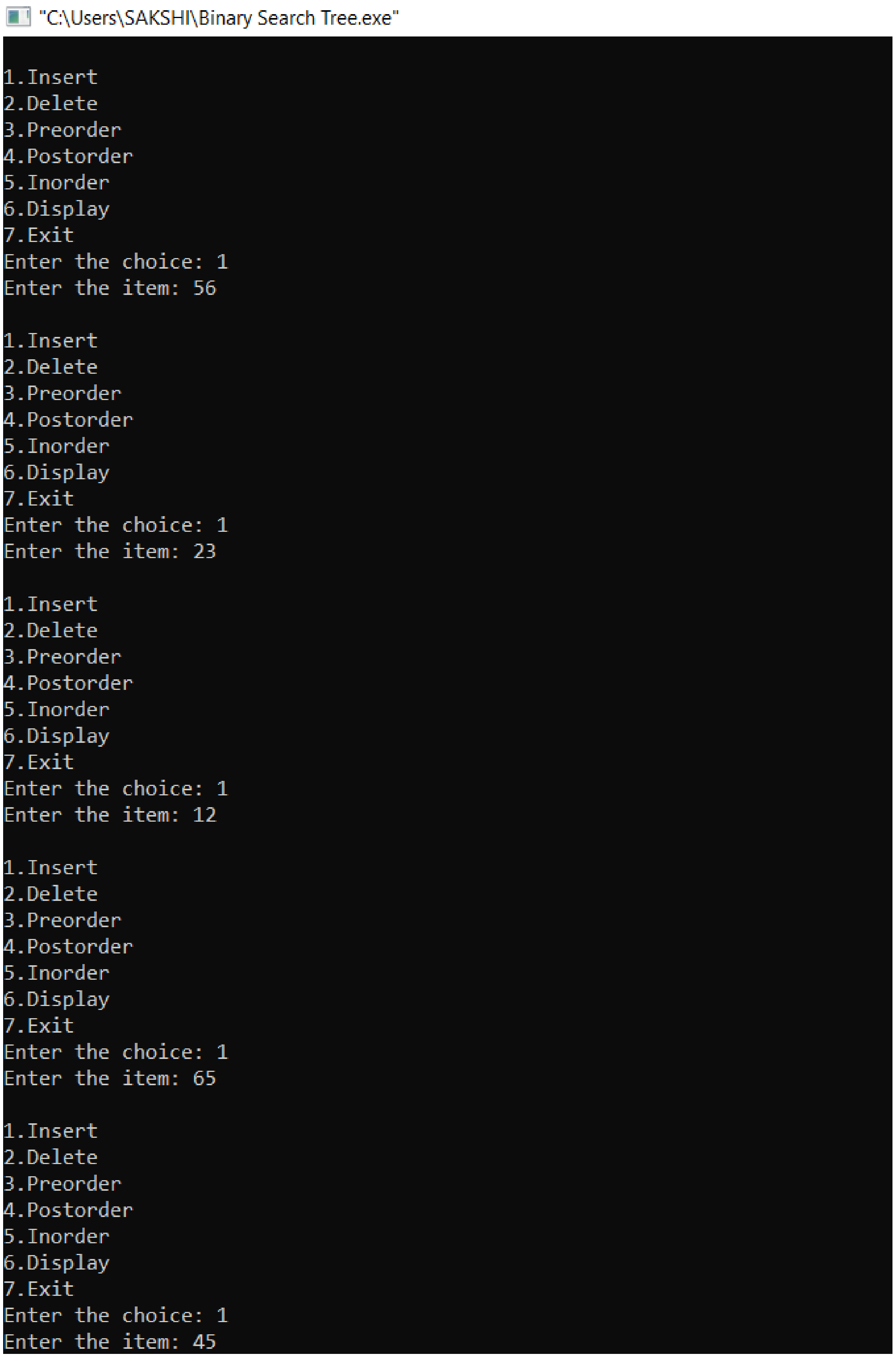
c) To display the elements in the tree.

```
#include<stdio.h>
#include<process.h>
struct node
{
   int info;
   struct node *rlink;
   struct node *llink;
};
typedef struct node *NODE;
NODE getnode()
{
   NODE x;
   x=(NODE)malloc(sizeof(struct node));
   if(x==NULL)
   {
      printf("Memory is full.\n");
      exit(0);
   }
   return x;
}
void freenode(NODE x)
```

```
{
    free(x);
}
NODE insert(NODE root,int item)
{
    NODE temp,cur,prev;
    temp=getnode();
    temp->rlink=NULL;
    temp->llink=NULL;
    temp->info=item;
    if(root==NULL)
        return temp;
    prev=NULL;
    cur=root;
    while(cur!=NULL)
    {
        prev=cur;
        cur=(item<cur->info)?cur->llink:cur->rlink;
    }
    if(item<prev->info)
        prev->llink=temp;
    else
        prev->rlink=temp;
    return root;
}
NODE delete(NODE root,int item)
{
    NODE cur,parent,q,suc;
```

```
if(root==NULL)
{
    printf("Empty\n");
    return root;
}
parent=NULL;
cur=root;
while(cur!=NULL&&item!=cur->info)
{
    parent=cur;
    cur=(item<cur->info)?cur->llink:cur->rlink;
}
if(cur==NULL)
{
    printf("Not found.\n");
    return root;
}
if(cur->llink==NULL)
    q=cur->rlink;
else if(cur->rlink==NULL)
    q=cur->llink;
else
{
    suc=cur->rlink;
    while(suc->llink!=NULL)
        suc=suc->llink;
    suc->llink=cur->llink;
    q=cur->rlink;
    }
    if(parent==NULL)
        return q;
    if(cur==parent->llink)
        parent->llink=q;
    else
        parent->rlink=q;
    freenode(cur);
    return root;
}
void preorder(NODE root)
{
    if(root!=NULL)
    {
        printf("%d\n",root->info);
        preorder(root->llink);
        preorder(root->rlink);
    }
}
void postorder(NODE root)
{
    if(root!=NULL)
    {
        postorder(root->llink);
        postorder(root->rlink);
        printf("%d\n",root->info);
    }
}
```

```
void inorder(NODE root)
{
    if(root!=NULL)
    {
        inorder(root->llink);
        printf("%d\n",root->info);
        inorder(root->rlink); }
}
void display(NODE root,int i)
{
    int j;
    if(root!=NULL)
    {
        display(root->rlink,i+1);
        for(j=0;j<i;j++)
          printf("   ");
        printf("%d\n",root->info);
        display(root->llink,i+1);}
}
void main()
{
    int item,choice;
    NODE root=NULL;
    for(;;)
    {
        printf("\n1.Insert\n2.Delete\n3.Preorder\n4.Postorder\n5.Inorder\n6.Display
        \n7.Exit\n");
        printf("Enter the choice: ");
        scanf("%d",&choice);
        switch(choice)
        {
            case 1: printf("Enter the item: ");
                    scanf("%d",&item);
                    root=insert(root,item);
                    break;
            case 2: printf("Enter the item: ");
                    scanf("%d",&item);
                    root=delete(root,item);
                    break;
            case 3: printf("Preorder traversal: \n");
                    preorder(root);
                    break;
            case 4: printf("Postorder traversal: \n");
                    postorder(root);
                    break;
            case 5: printf("Inorder traversal: \n");
                    inorder(root);
                    break;
            case 6: printf("Elements in the tree: \n");
                    display(root,0);
                    break;
            default:exit(0);
                    break;
        }
    }
}
```


"C:\Users\SAKSHI\Binary Search Tree.exe"

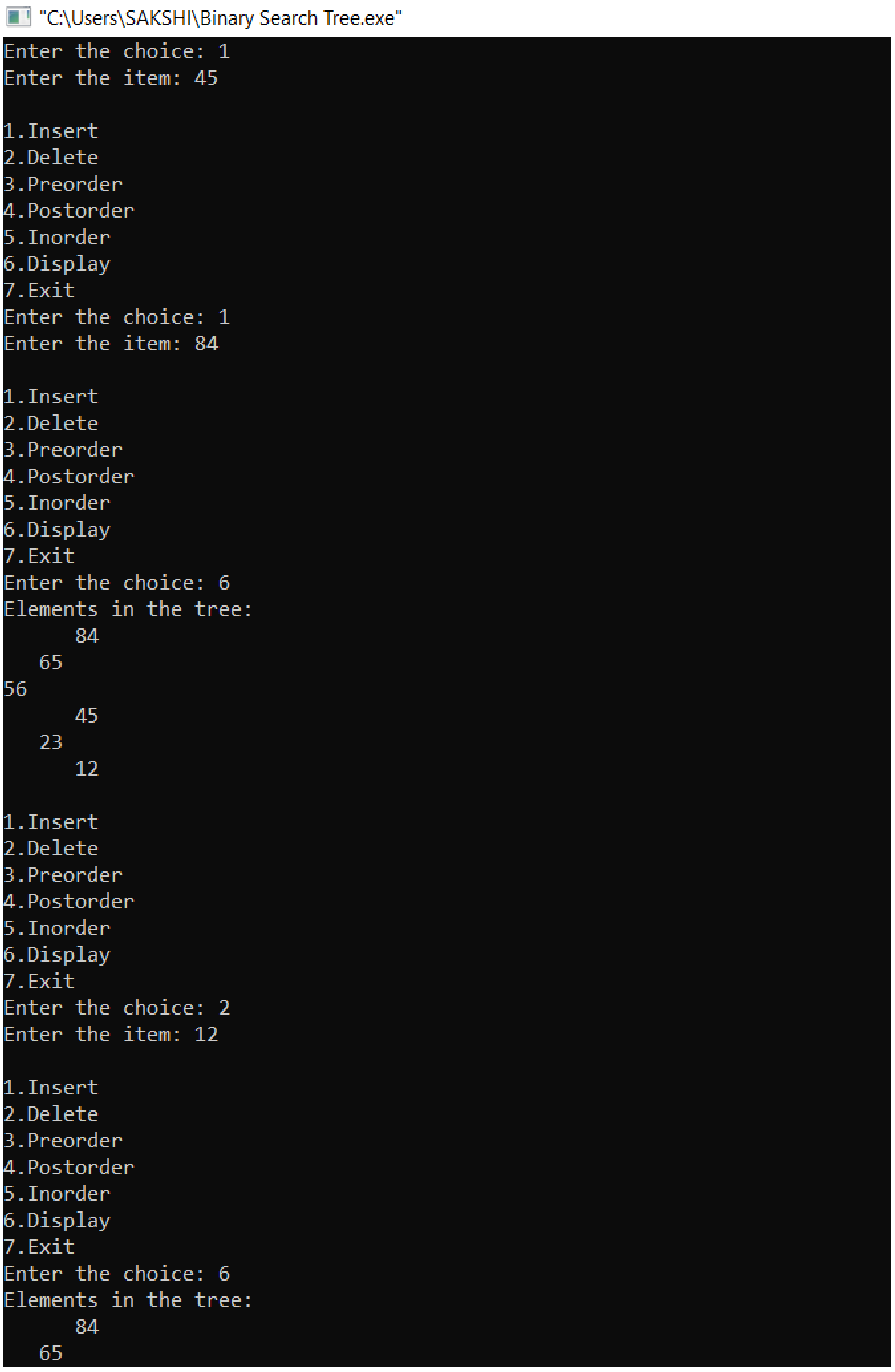
```
1.Insert
2.Delete
3.Preorder
4.Postorder
5.Inorder
6.Display
7.Exit
Enter the choice: 1
Enter the item: 56

1.Insert
2.Delete
3.Preorder
4.Postorder
5.Inorder
6.Display
7.Exit
Enter the choice: 1
Enter the item: 23

1.Insert
2.Delete
3.Preorder
4.Postorder
5.Inorder
6.Display
7.Exit
Enter the choice: 1
Enter the item: 12

1.Insert
2.Delete
3.Preorder
4.Postorder
5.Inorder
6.Display
7.Exit
Enter the choice: 1
Enter the item: 65

1.Insert
2.Delete
3.Preorder
4.Postorder
5.Inorder
6.Display
7.Exit
Enter the choice: 1
Enter the item: 45
```



"C:\Users\SAKSHI\Binary Search Tree.exe"

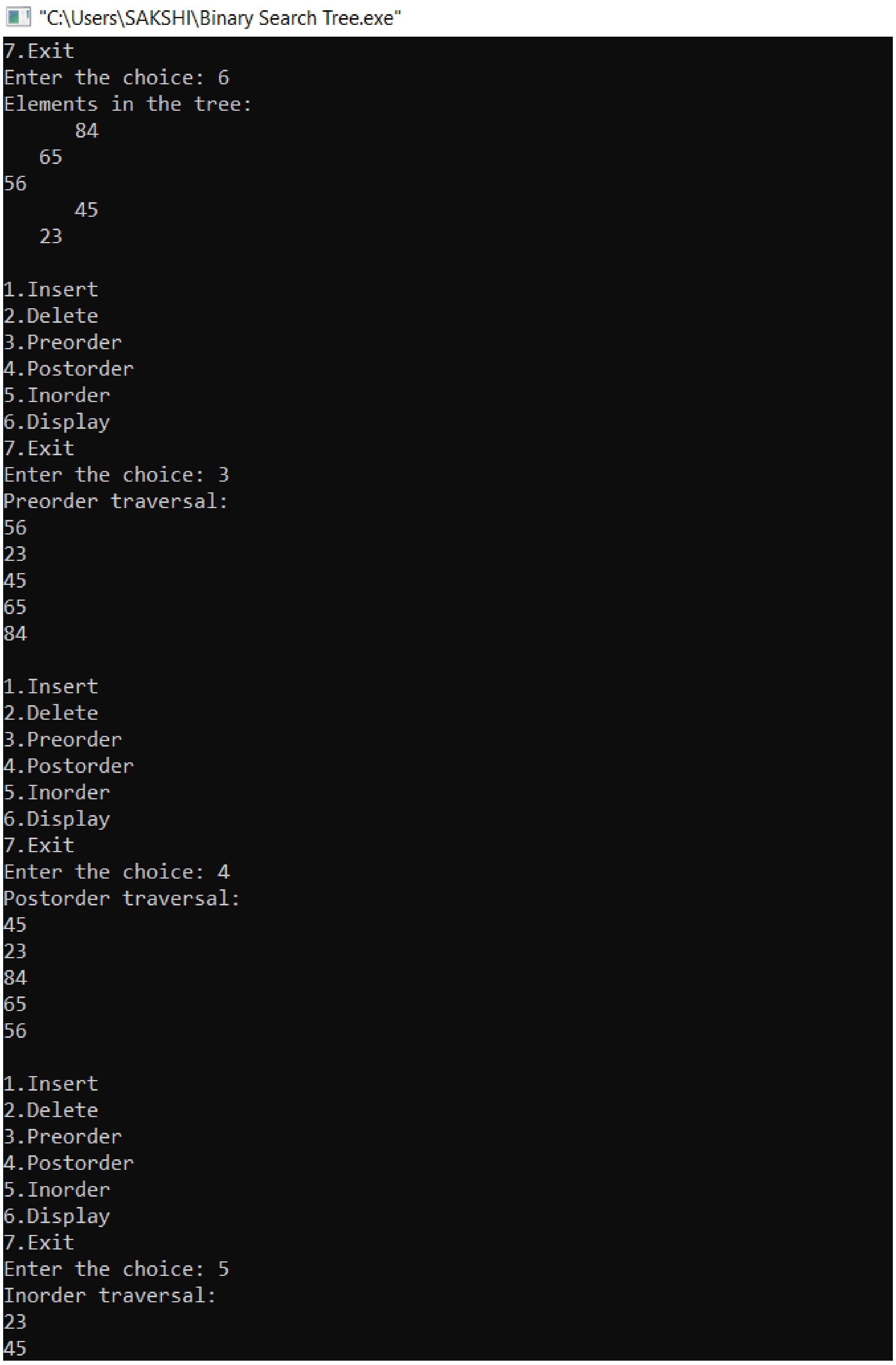
```
Enter the choice: 1
Enter the item: 45

1.Insert
2.Delete
3.Preorder
4.Postorder
5.Inorder
6.Display
7.Exit
Enter the choice: 1
Enter the item: 84

1.Insert
2.Delete
3.Preorder
4.Postorder
5.Inorder
6.Display
7.Exit
Enter the choice: 6
Elements in the tree:
      84
   65
56
      45
   23
      12

1.Insert
2.Delete
3.Preorder
4.Postorder
5.Inorder
6.Display
7.Exit
Enter the choice: 2
Enter the item: 12

1.Insert
2.Delete
3.Preorder
4.Postorder
5.Inorder
6.Display
7.Exit
Enter the choice: 6
Elements in the tree:
      84
   65
```

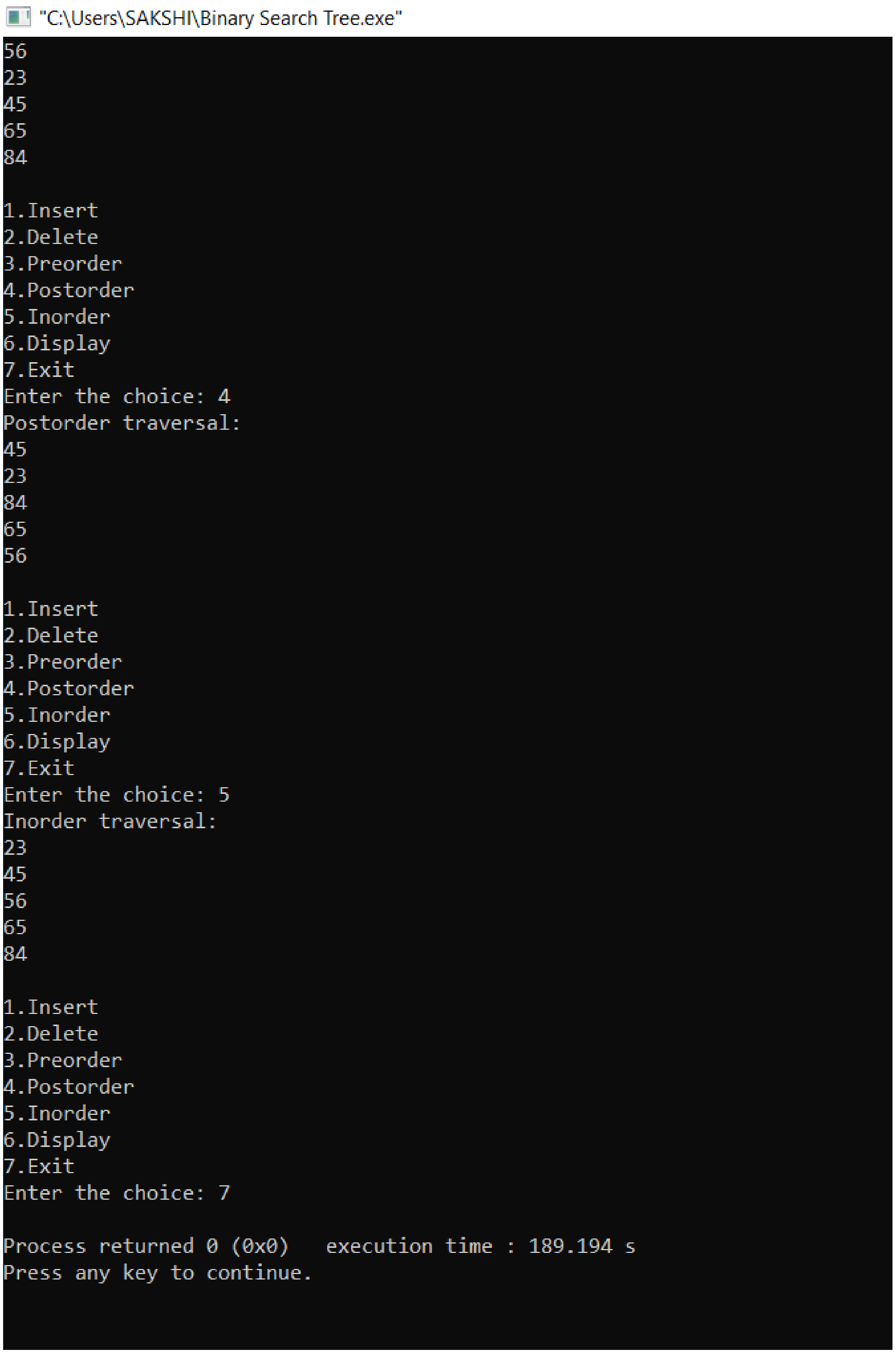

"C:\Users\SAKSHI\Binary Search Tree.exe"

```
7.Exit
Enter the choice: 6
Elements in the tree:
      84
   65
56
      45
   23

1.Insert
2.Delete
3.Preorder
4.Postorder
5.Inorder
6.Display
7.Exit
Enter the choice: 3
Preorder traversal:
56
23
45
65
84

1.Insert
2.Delete
3.Preorder
4.Postorder
5.Inorder
6.Display
7.Exit
Enter the choice: 4
Postorder traversal:
45
23
84
65
56

1.Insert
2.Delete
3.Preorder
4.Postorder
5.Inorder
6.Display
7.Exit
Enter the choice: 5
Inorder traversal:
23
45
```


"C:\Users\SAKSHI\Binary Search Tree.exe"

```
56
23
45
65
84

1.Insert
2.Delete
3.Preorder
4.Postorder
5.Inorder
6.Display
7.Exit
Enter the choice: 4
Postorder traversal:
45
23
84
65
56

1.Insert
2.Delete
3.Preorder
4.Postorder
5.Inorder
6.Display
7.Exit
Enter the choice: 5
Inorder traversal:
23
45
56
65
84

1.Insert
2.Delete
3.Preorder
4.Postorder
5.Inorder
6.Display
7.Exit
Enter the choice: 7

Process returned 0 (0x0)   execution time : 189.194 s
Press any key to continue.
```