LAB PROGRAM-10

Write a program
a) To construct a binary Search tree.
b) To traverse the tree using all the methods i.e., in-order, preorder and post order
c) To display the elements in the tree.

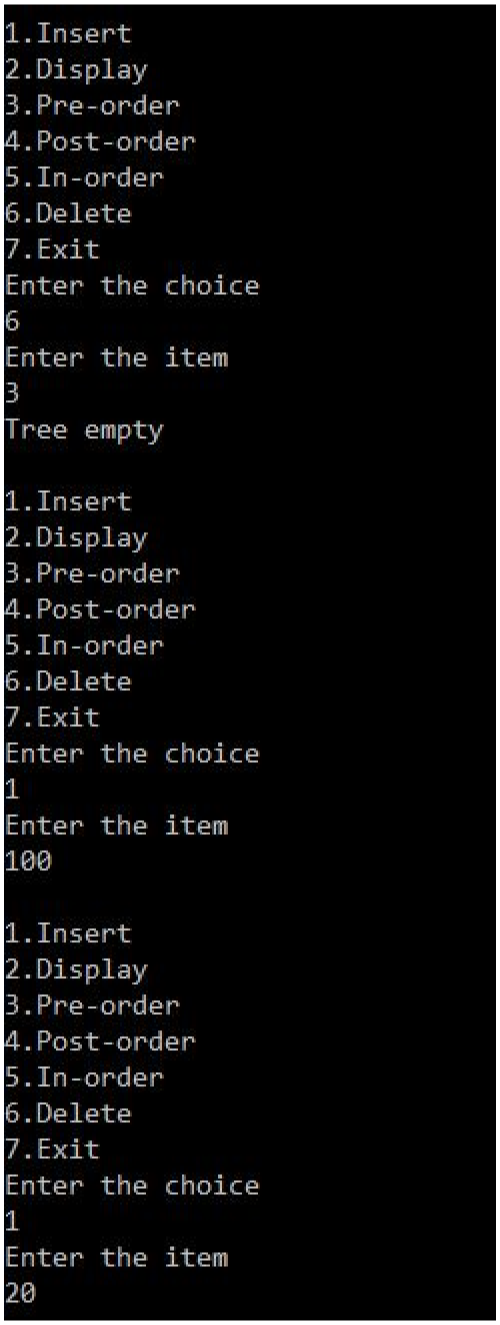
CODE:

```
#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 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;
```

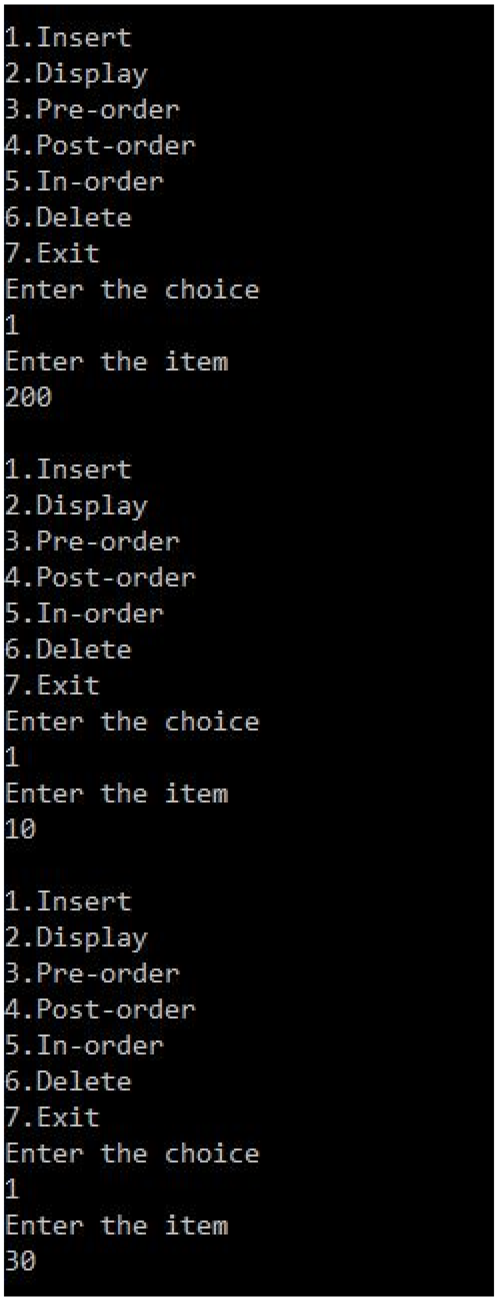
```
while(cur!=NULL)
{
prev=cur;
cur=(item<cur->info)?cur->llink:cur->rlink;
}
if(item<prev->info)
 prev->llink=temp;
else
 prev->rlink=temp;
return root;
}
void display(NODE root,int i)
{
int j;
if(root!=NULL)
 {
  display(root->rlink,i+1);
  for(j=0;j<i;j++)
              printf("  ");
   printf("%d\n",root->info);
             display(root->llink,i+1);
 }
}
NODE delete(NODE root,int item)
{
NODE cur,parent,q,suc;
if(root==NULL)
{
printf("Tree 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 main()
{
int item,choice;
NODE root=NULL;
for(;;)
{
printf("\n1.Insert\n2.Display\n3.Pre-order\n4.Post-order\n5.In-order\n6.Delete\n7.Exit\n");
printf("Enter the choice\n");
scanf("%d",&choice);
switch(choice)
 {
  case 1:printf("Enter the item\n");
                        scanf("%d",&item);
                        root=insert(root,item);
                        break;
  case 2:printf("Contents of Binary Search Tree:\n");
      display(root,0);
                        break;
  case 3:printf("Pre-order:\n");
      preorder(root);
                        break;
  case 4:printf("Post-order:\n");
      postorder(root);
                        break;
  case 5:printf("In-order:\n");
      inorder(root);
                        break;
  case 6:printf("Enter the item\n");
                        scanf("%d",&item);
                        root=delete(root,item);
                        break;
  case 7:exit(0);
  default:printf("Invalid choice\n");
             }
           }
 }
```

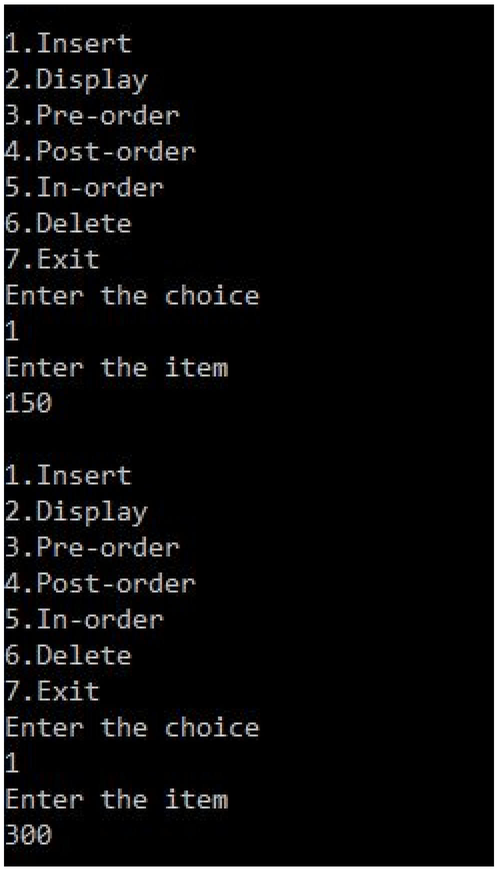
OUTPUT:



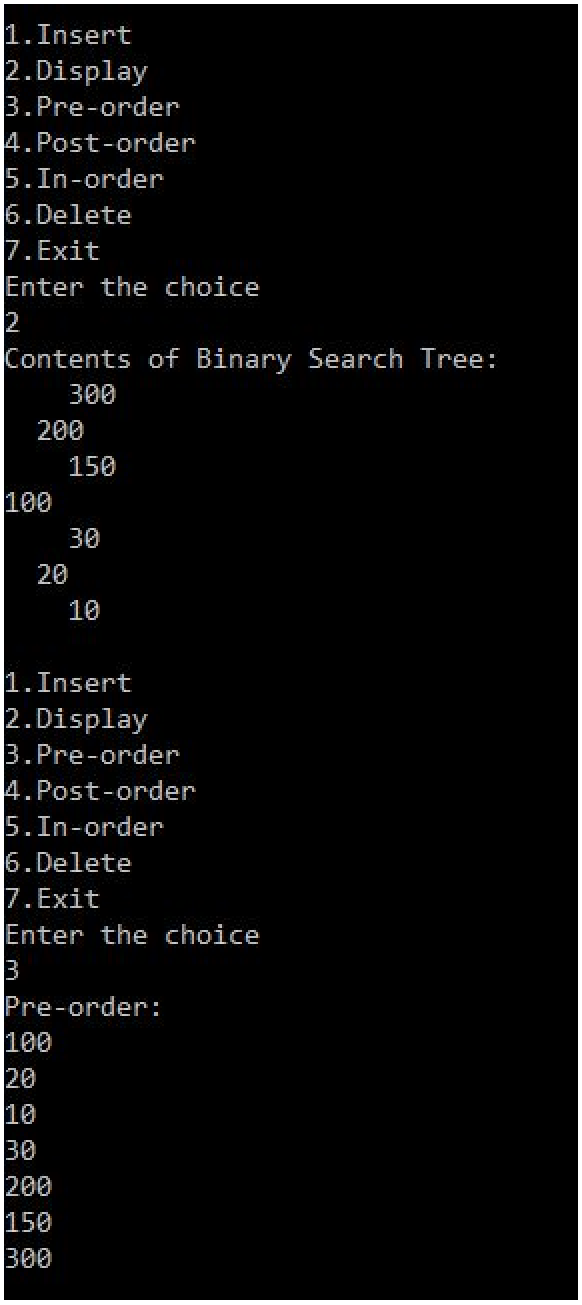
```
1.Insert
2.Display
3.Pre-order
4.Post-order
5.In-order
6.Delete
7.Exit
Enter the choice
6
Enter the item
3
Tree empty

1.Insert
2.Display
3.Pre-order
4.Post-order
5.In-order
6.Delete
7.Exit
Enter the choice
1
Enter the item
100

1.Insert
2.Display
3.Pre-order
4.Post-order
5.In-order
6.Delete
7.Exit
Enter the choice
1
Enter the item
20
```



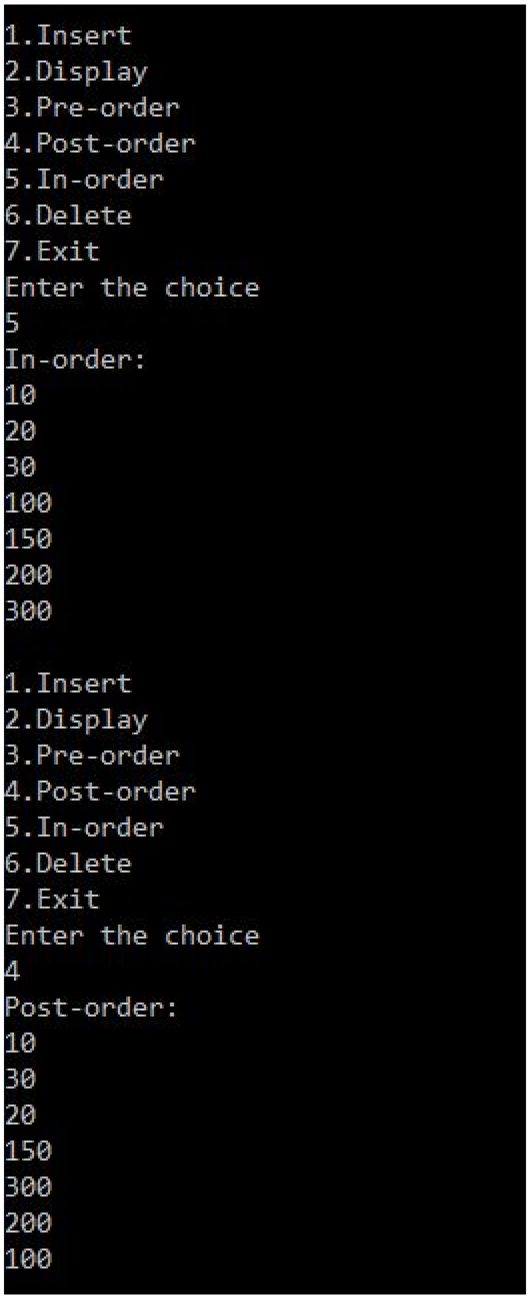
```
1.Insert
2.Display
3.Pre-order
4.Post-order
5.In-order
6.Delete
7.Exit
Enter the choice
1
Enter the item
200

1.Insert
2.Display
3.Pre-order
4.Post-order
5.In-order
6.Delete
7.Exit
Enter the choice
1
Enter the item
10

1.Insert
2.Display
3.Pre-order
4.Post-order
5.In-order
6.Delete
7.Exit
Enter the choice
1
Enter the item
30
```



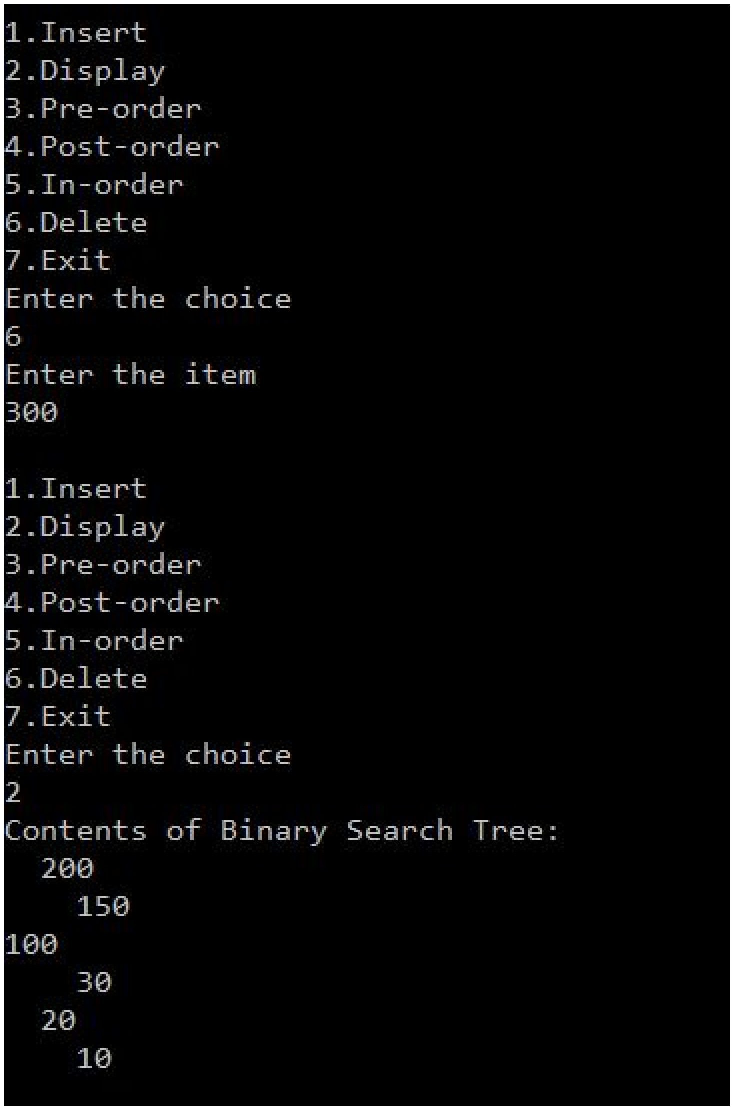
```
1.Insert
2.Display
3.Pre-order
4.Post-order
5.In-order
6.Delete
7.Exit
Enter the choice
1
Enter the item
150

1.Insert
2.Display
3.Pre-order
4.Post-order
5.In-order
6.Delete
7.Exit
Enter the choice
1
Enter the item
300
```



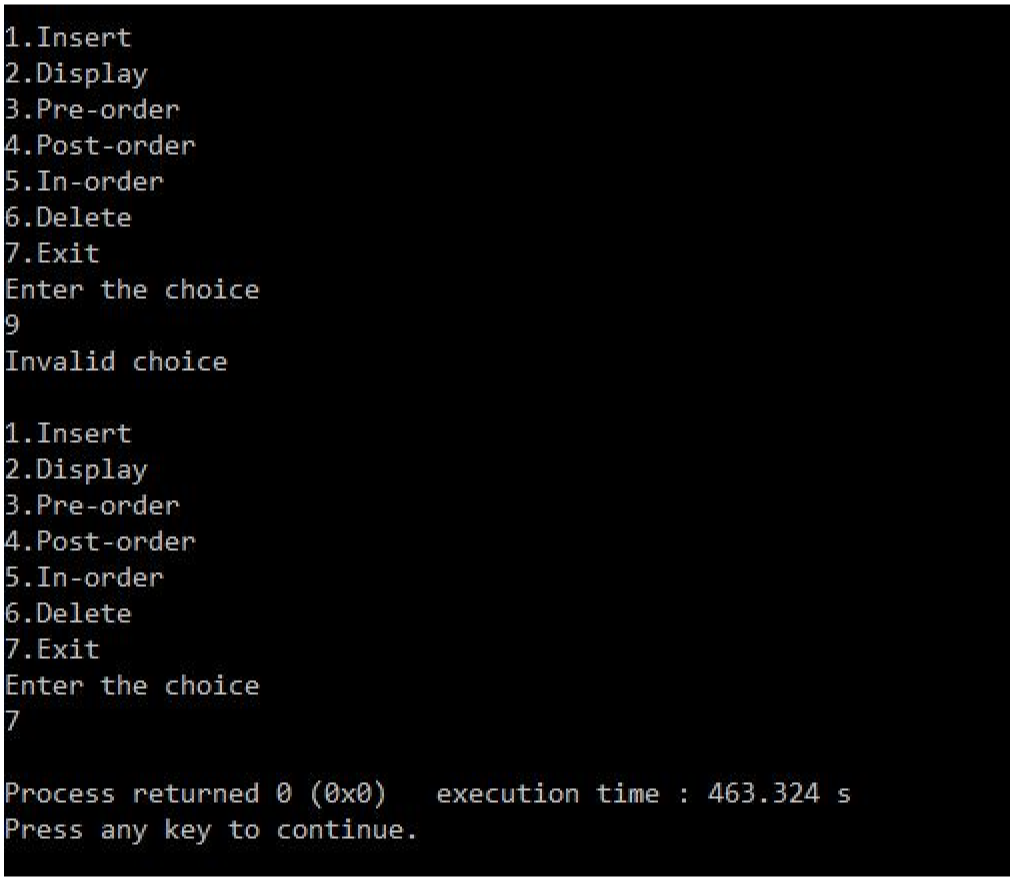
```
1.Insert
2.Display
3.Pre-order
4.Post-order
5.In-order
6.Delete
7.Exit
Enter the choice
2
Contents of Binary Search Tree:
    300
  200
    150
100
    30
  20
    10

1.Insert
2.Display
3.Pre-order
4.Post-order
5.In-order
6.Delete
7.Exit
Enter the choice
3
Pre-order:
100
20
10
30
200
150
300
```



```
1.Insert
2.Display
3.Pre-order
4.Post-order
5.In-order
6.Delete
7.Exit
Enter the choice
5
In-order:
10
20
30
100
150
200
300

1.Insert
2.Display
3.Pre-order
4.Post-order
5.In-order
6.Delete
7.Exit
Enter the choice
4
Post-order:
10
30
20
150
300
200
100
```



```
1.Insert
2.Display
3.Pre-order
4.Post-order
5.In-order
6.Delete
7.Exit
Enter the choice
6
Enter the item
300

1.Insert
2.Display
3.Pre-order
4.Post-order
5.In-order
6.Delete
7.Exit
Enter the choice
2
Contents of Binary Search Tree:
  200
    150
100
    30
  20
    10
```



```
1.Insert
2.Display
3.Pre-order
4.Post-order
5.In-order
6.Delete
7.Exit
Enter the choice
9
Invalid choice

1.Insert
2.Display
3.Pre-order
4.Post-order
5.In-order
6.Delete
7.Exit
Enter the choice
7

Process returned 0 (0x0)   execution time : 463.324 s
Press any key to continue.
```