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.

```
#include<stdio.h>
#include<stdlib.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 is 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  ",root->info);
  preorder(root->llink);
  preorder(root->rlink);
  }
 }
void postorder(NODE root)
```

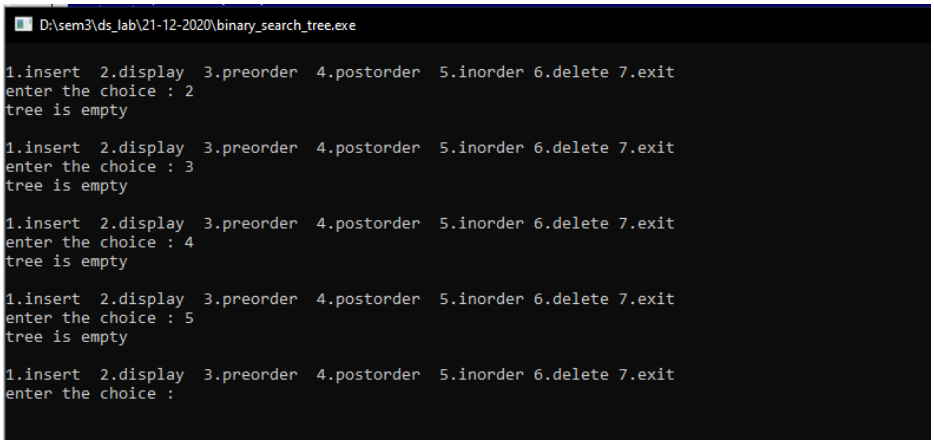
```
{
if(root!=NULL)
 {

  postorder(root->llink);
  postorder(root->rlink);
  printf("%d  ",root->info);
  }
 }
void inorder(NODE root)
{
if(root!=NULL)
 {

  inorder(root->llink);
  printf("%d  ",root->info);
  inorder(root->rlink);
  }
 }
void main()
{
int item,choice;
NODE root=NULL;
for(;;)
{
printf("\n1.insert  2.display  3.preorder  4.postorder
5.inorder 6.delete 7.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:
          if(root!=NULL)
           display(root,0);
           else
```

```
            printf("tree is empty \n");
           break;
  case 3:
         if(root!=NULL)
           preorder(root);
         else
           printf("tree is empty \n");
          break;
  case 4:
         if(root!=NULL)
           postorder(root);
         else
           printf("tree is empty \n");
          break;
  case 5:
         if(root!=NULL)
           inorder(root);
         else
           printf("tree is empty \n");
          break;
  case 6:printf("enter the item  : ");
          scanf("%d",&item);
          root=delete(root,item);
          break;
  default:exit(0);
           break;
      }
    }
 }
```

OUTPUT:



```
D:\sem3\ds_lab\21-12-2020\binary_search_tree.exe
1.insert  2.display  3.preorder  4.postorder  5.inorder 6.delete 7.exit
enter the choice : 1
enter the item : 56

1.insert  2.display  3.preorder  4.postorder  5.inorder 6.delete 7.exit
enter the choice : 2
  79
    56
49
    34
  23

1.insert  2.display  3.preorder  4.postorder  5.inorder 6.delete 7.exit
enter the choice : 1
enter the item : 12

1.insert  2.display  3.preorder  4.postorder  5.inorder 6.delete 7.exit
enter the choice : 1
enter the item : 100

1.insert  2.display  3.preorder  4.postorder  5.inorder 6.delete 7.exit
enter the choice : 2
    100
  79
    56
49
    34
  23
    12
```

```
1.insert  2.display  3.preorder  4.postorder  5.inorder 6.delete 7.exit
enter the choice : 2
    100
  79
    56
49
    34
  23
    12

1.insert  2.display  3.preorder  4.postorder  5.inorder 6.delete 7.exit
enter the choice : 3
49  23  12  34  79  56  100
1.insert  2.display  3.preorder  4.postorder  5.inorder 6.delete 7.exit
enter the choice : 3
49  23  12  34  79  56  100
1.insert  2.display  3.preorder  4.postorder  5.inorder 6.delete 7.exit
enter the choice : 4
12  34  23  56  100  79  49
1.insert  2.display  3.preorder  4.postorder  5.inorder 6.delete 7.exit
enter the choice : 5
12  23  34  49  56  79  100
1.insert  2.display  3.preorder  4.postorder  5.inorder 6.delete 7.exit
```

```
1.insert  2.display  3.preorder  4.postorder  5.inorder 6.delete 7.exit
enter the choice : 6
enter the item  : 5
not found

1.insert  2.display  3.preorder  4.postorder  5.inorder 6.delete 7.exit
enter the choice : 6
enter the item  : 49
```

****