Q2.Write a non recursive C program to implement inorder , preorder and postorder traversal for a BST.

PROGRAM:

```
#include<stdio.h>
#include<stdlib.h>
#define MAX 50 struct
node
{       struct node
*left;
      int info;       struct
node *right;
};

struct node *insert(struct node *root, int ele );
void preorder(struct node *root); void
inorder(struct node *root); void
postorder(struct node *root); void
display(struct node *ptr,int level);
struct node *queue[MAX];
int front=-1,rear=-1; void
enqueue(struct node *item);
struct node *DeQue(); int
Qempty();

struct node *stack[MAX]; int
top=-1; void Push(struct
node *item); struct node
*Pop(); int StkEmt();

int main( )
{
```

```
    struct node *root=NULL;
    int x,y, ele;
while(y=1)
    {
        printf("\n 1.Insert");
printf("\n 2.Display");
printf("\n 3.Preorder");
printf("\n 4.Inorder");
printf("\n 5.Postorder");
printf("\n 6.Exit ");
printf("\n Choose option:");
scanf("%d",&x);          switch(x)
        {
case 1:
            printf("\nEnter Element : ");
scanf("%d",&ele);              root =
insert(root, ele);
            break;

        case 2:
            printf("\n\t");
display(root,0);
printf("\n\t");              break;
         case
3:
            preorder(root);
            break;

        case 4:
inorder(root);
break;
```

```
            case 5:
postorder(root);
                    break;
             case 6:
exit(1);
y=0;

            default:
                    printf("\nWrong Input!!!x\n");
            }
      }
      return 0;
}



struct node *insert(struct node *root, int ele)
{
      struct node *tmp,*p,*ptr;
      ptr = root;        p
= NULL;        while(
ptr!=NULL)
      {              p
= ptr;
            if(ele < ptr->info) ptr
                    = ptr->left;

            else
ptr = ptr->right;
      }
      tmp=(struct node *)malloc(sizeof(struct node));
tmp->info=ele;        tmp->left=NULL;        tmp-
```

```
>right=NULL;        if(p==NULL)                root=tmp;
else if( ele < p->info )                p->left=tmp;        else
p->right=tmp;        return root;
}
void preorder(struct node *root)
{
      struct node *ptr = root;
if( ptr==NULL )
      {
            printf("Tree is empty\n");
return;
      }
      printf("\n Pre-order : ");
Push(ptr);                    while(
!StkEmt() )
      {
            ptr = Pop();
printf("%d  ",ptr->info);
            if(ptr->right!=NULL)
                  Push(ptr->right);
            if(ptr->left!=NULL)
                  Push(ptr->left);
      }
      printf("\t");
}
void inorder(struct node *root)
{
      struct node *ptr=root;

      if( ptr==NULL )
      {
```

```
            printf("Tree is empty\n");
            return;
      }
      printf("\n In-order : ");
while(1)
      {
         while(ptr->left!=NULL )
            {
                  Push(ptr);
ptr = ptr->left;
            }
            while( ptr->right==NULL )
            {
                  printf("%d   ",ptr->info);
if(StkEmt())                        return;
ptr = Pop();
            }
            printf("%d  ",ptr->info);
ptr = ptr->right;

      }
}
void postorder(struct node *root)
{
      struct node *ptr = root;
struct node *q;        if(
ptr==NULL )
      {
            printf("Tree is empty\n");
return;
      }
```

```
    q = root;          printf("\n
Post-order : ");       while(1)
    {
        while(ptr->left!=NULL)
        {
            Push(ptr);
ptr=ptr->left;
        }
        while( ptr->right==NULL || ptr->right==q )
        {
            printf("%d   ",ptr->info);
q = ptr;                    if( StkEmt() )
return;                  ptr = Pop();
        }
        Push(ptr);
ptr = ptr->right;
    }
    printf("\t");
}
void enqueue(struct node *item)
{
    if(rear==MAX-1)
    {
        printf("queue Overflow\n");
        return;
    }
    if(front==-1)
front=0;
rear=rear+1;
queue[rear]=item ;
}
```

```
struct node *DeQue()
{
    struct node *item;
if(front==-1 || front==rear+1)
    {
        printf("queue Underflow\n");
        return 0;
    }
    item=queue[front];
front=front+1;      return
item;
}
int Qempty()
{
    if(front==-1 || front==rear+1)
        return 1;
else
        return 0;
}
void Push(struct node *item)
{
    if(top==(MAX-1))
    {
        printf("stack Overflow\n");
        return;
    }
    top=top+1;
stack[top]=item;
}
struct node *Pop()
{
```

```
    struct node *item;
if(top==-1)
    {
        printf("stack Underflow….\n");
        exit(1);
    }
    item=stack[top];
top=top-1;      return
item;
}
int StkEmt()
{
    if(top==-1)
return 1;       else
return 0;
}
void display(struct node *ptr,int level)
{       int
i;
    if(ptr == NULL )
return;       else
    {
      display(ptr->right, level+1);
printf("\n\t");                for (i=0;
i<level; i++)
        printf("    ");
printf("%d", ptr->info);
display(ptr->left, level+1);
    }
}
```

OUTPUT:-


"Z:\stucture c program\study (sir)\a1.exe"
1.Insert
2.Display
3.Preorder
4.Inorder
5.Postorder
6.Exit
Choose option:1
Enter Element : 7
1.Insert
2.Display
3.Preorder
4.Inorder
5.Postorder
6.Exit
Choose option:1
Enter Element : 5
1.Insert
2.Display
3.Preorder
4.Inorder
5.Postorder
6.Exit
Choose option:1
Enter Element : 6
1.Insert
2.Display
3.Preorder
4.Inorder
5.Postorder
6.Exit
Choose option:1


"Z:\stucture c program\study (sir)\a1.exe"
Choose option:1
Enter Element : 6
1.Insert
2.Display
3.Preorder
4.Inorder
5.Postorder
6.Exit
Choose option:1
Enter Element : 4
1.Insert
2.Display
3.Preorder
4.Inorder
5.Postorder
6.Exit
Choose option:1
Enter Element : 9
1.Insert
2.Display
3.Preorder
4.Inorder
5.Postorder
6.Exit
Choose option:1
Enter Element : 8
1.Insert
2.Display
3.Preorder
4.Inorder
5.Postorder

Q3.Write C program to implement Depth first search and Breadth first search traversals of a graph.

BFS PROGRAM:

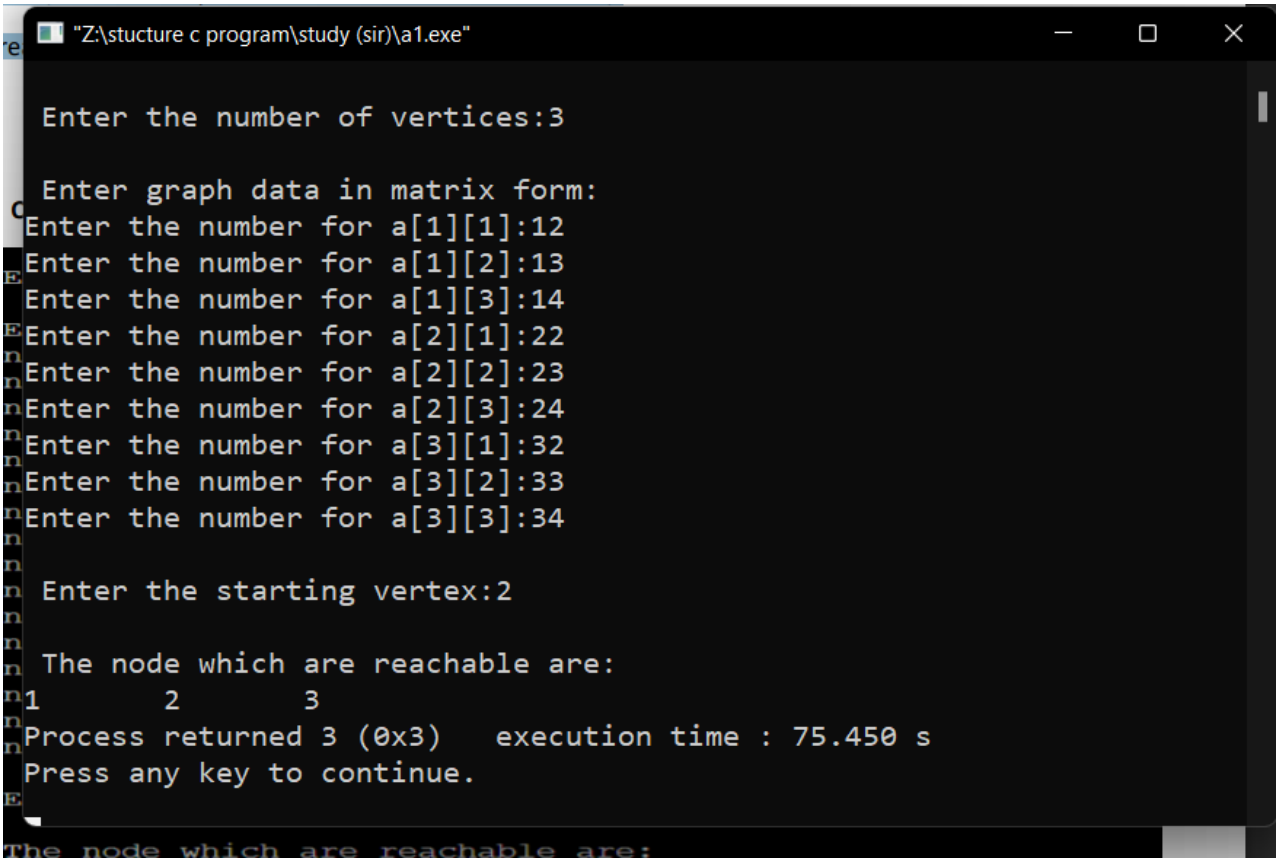
#include<stdio.h> #include<stdlib.h> int

a[20][20], q[20], visited[20], n, i, j, f = 0, r = -1;

```
void bfs(int v) {  for(i =
1; i <= n; i++)  if(a[v][i]
&& !visited[i])  q[++r] =
i;  if(f <= r) {
visited[q[f]] = 1;
bfs(q[f++]);
 }
}

void main() {
 int v;  printf("\n Enter the number of
vertices:");  scanf("%d", &n);

 for(i=1; i <= n; i++) {
q[i] = 0;  visited[i] =
0;
 }

 printf("\n Enter graph data in matrix form:\n");
 for(i=1; i<=n; i++) {  for(j=1;j<=n;j++) {
printf("Enter the number for a[%d][%d]:",i,j);
scanf("%d",&a[i][j]);

 }
 }

 printf("\n Enter the starting vertex:");
scanf("%d", &v);
 bfs(v);  printf("\n The node which are reachable
are:\n");
```

```
 for(i=1; i <= n; i++) {
if(visited[i])
printf("%d\t", i);  else
{
 printf("\n Bfs is not possible. Not all nodes are reachable");
break;
 }
 }
}
```

OUTPUT:



DFS PROGRAM:

```
include<stdio.h>
#include<conio.h> int
a[20][20],reach[20],n;
void dfs(int v)
```

```
{  int
i;
 reach[v]=1;
for(i=1;i<=n;i++)
if(a[v][i] && !reach[i])
  {
   printf("\n %d->%d",v,i);
   dfs(i);
  }
}
void main()
{
 int i,j,count=0;  printf("\n Enter
number of vertices:");
scanf("%d",&n);  for(i=1;i<=n;i++)
 {
  reach[i]=0;
for(j=1;j<=n;j++)
   a[i][j]=0;
 }
 printf("\n Enter the adjacency matrix:\n");
for(i=1;i<=n;i++)   for(j=1;j<=n;j++)
scanf("%d",&a[i][j]);  dfs(1);
 printf("\n");
for(i=1;i<=n;i++)
 {
  if(reach[i])
count++;
 }
 if(count==n)   printf("\n Graph is
connected");
```

```
 else   printf("\n Graph is not
connected");
}
```

OUTPUT: