VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.

DATA STRUCTURE LAB RECORD

Submitted by

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Under the Guidance of

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in partial fulfillment for the award of the degree of
BACHELOR OF ENGINEERING
in
COMPUTER SCIENCE AND ENGINEERING

B.M.S. COLLEGE OF ENGINEERING
(Autonomous Institution under VTU)
BENGALURU-560019
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B. M. S. College of Engineering,
Bull Temple Road, Bangalore 560019
(Affiliated To Visvesvaraya Technological University, Belgaum)

Department of Computer Science and Engineering

CERTIFICATE

This is to certify that the LAB RECORD carried out by **XYZ (1BM19CS000)** who is the bonafide students of **B. M. S. College of Engineering.** It is in partial fulfillment for the award of **Bachelor of Engineering in Computer Science and Engineering** of the Visveswaraiah Technological University, Belgaum during the year 2020-2021. The lab report has been approved as it satisfies the academic requirements in respect of **DATA STRUCTURE LAB RECORD (19CS3PCDST)** work prescribed for the said degree.

Signature of the Guide	Signature of the HOD
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BMSCE, Bengaluru	BMSCE, Bengaluru

External Viva

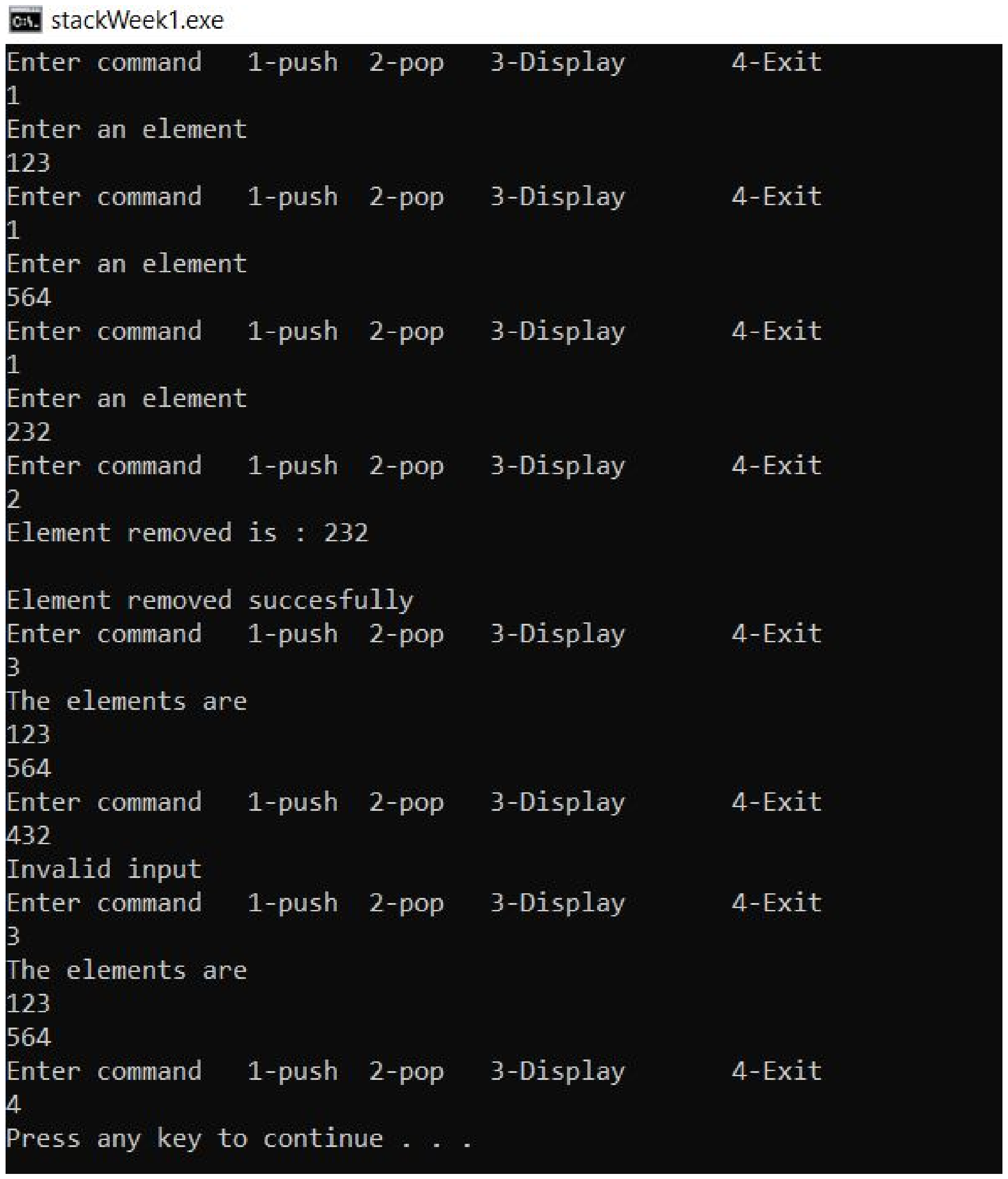
Name of the Examiner	Signature with date
1.______________________________	_________________________
2. ______________________________	__________________________

Lab Programs:

Lab Programs 1:

```
 #include <stdio.h>
#include <stdlib.h>
#define SIZE 5
int top=-1;
int stack[SIZE];
void push(int ele)
 {if(top==SIZE-1)
    { printf("The stack is full\n");    }
    else{
        top++;
        stack[top]=ele;}}
 int pop()
 {   if(top==-1)
     {       return 0}
     else
     {   printf("Element removed is : %d\n",stack[top--]);
         return 1;
     }}
 void display()
 {
     if(top==-1)
         printf("The stack is empty\n");
     else
     {
         printf("The elements are\n");
         for(int i=0;i<=top;i++)
         {
             printf("%d\n",stack[i]);
         }} }
```

```
int main()
{
 int c,d,p;
 while(c!=4)
 {
 printf("Enter command\t1-push\t2-pop\t3-Display\t4-Exit\n");
 scanf("%d",&c);
 switch(c)
 {
  case 1:printf("Enter an element\n");
         scanf("%d",&d);
         push(d);
         break;
  case 2:p=pop();
         if(p==0)
          printf("Stack is empty\n");
          else
          printf("\nElement removed succesfully\n");
          break;
  case 3:display();
         break;
  case 4:break;
  default: printf("Invalid input\n");
 }}return 0;}
```


stackWeek1.exe

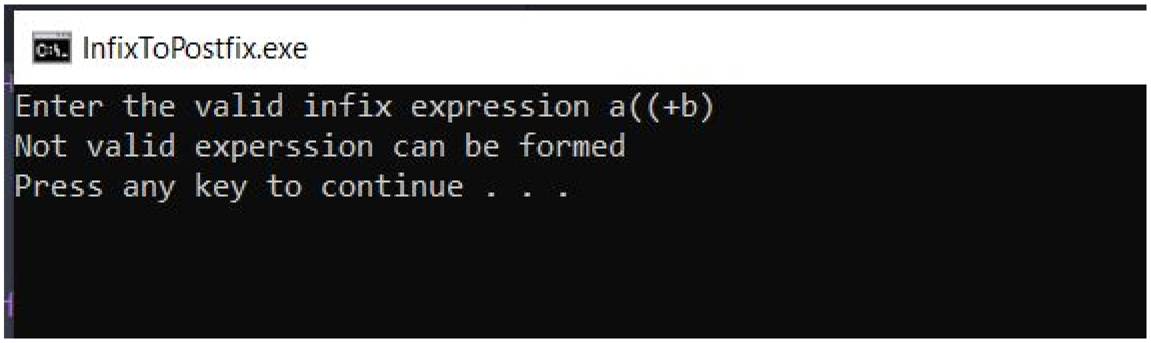
```
Enter command   1-push  2-pop   3-Display       4-Exit
1
Enter an element
123
Enter command   1-push  2-pop   3-Display       4-Exit
1
Enter an element
564
Enter command   1-push  2-pop   3-Display       4-Exit
1
Enter an element
232
Enter command   1-push  2-pop   3-Display       4-Exit
2
Element removed is : 232

Element removed succesfully
Enter command   1-push  2-pop   3-Display       4-Exit
3
The elements are
123
564
Enter command   1-push  2-pop   3-Display       4-Exit
432
Invalid input
Enter command   1-push  2-pop   3-Display       4-Exit
3
The elements are
123
564
Enter command   1-push  2-pop   3-Display       4-Exit
4
Press any key to continue . . .
```

Lab Programs 2:

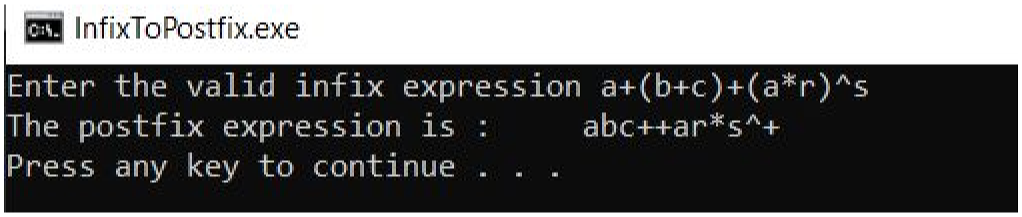
```
#include<stdio.h>

#include<string.h>

#include<stdlib.h>

int F(char symbol)

{
```

```
switch(symbol)
{
 case'+':
 case'-':return 2;
 case'*':
 case'/':return 4;
 case'^':
 case'$':return 5;
 case'(':return 0;
 case'#':return -1;
 default:return 8;}}
int G(char symbol)
{
switch(symbol)  {
 case'+':
 case'-':return 1;
 case'*':
 case'/':return 3;
 case'^':
 case'$':return 6;
 case'(':return 9;
 case')':return 0;
default:return 7;
  }}
int infix_postfix(char infix[],char postfix[])
{int top,i,j,d=0,f=0;
char s[30],symbol;
top=-1;
s[++top]='#';
j=0;
for(i=0;i<strlen(infix);i++)
 {
  if(infix[i]=='('){
   d++;}
   else if (infix[i]==')')
   f++;
symbol=infix[i];
while(F(s[top])>G(symbol))
{
postfix[j]=s[top--];
j++;
}
if(F(s[top])!=G(symbol))
s[++top]=symbol;
else
top--;
}

while(s[top]!='#')
{
postfix[j++]=s[top--];
}
postfix[j]='\0';
return (d+f);
}

void main()
{int a;
char infix[20];
char postfix[20];
printf("Enter the valid infix expression ");
scanf("%s",infix);
a= infix_postfix(infix , postfix );
if((strlen(postfix)+a)!=strlen(infix))
```

```
printf("Not valid experssion can be formed \n");

else

printf("The postfix expression is :\t%s\n",postfix);

}
```



```
InfixToPostfix.exe
Enter the valid infix expression a((+b)
Not valid experssion can be formed
Press any key to continue . . .
```

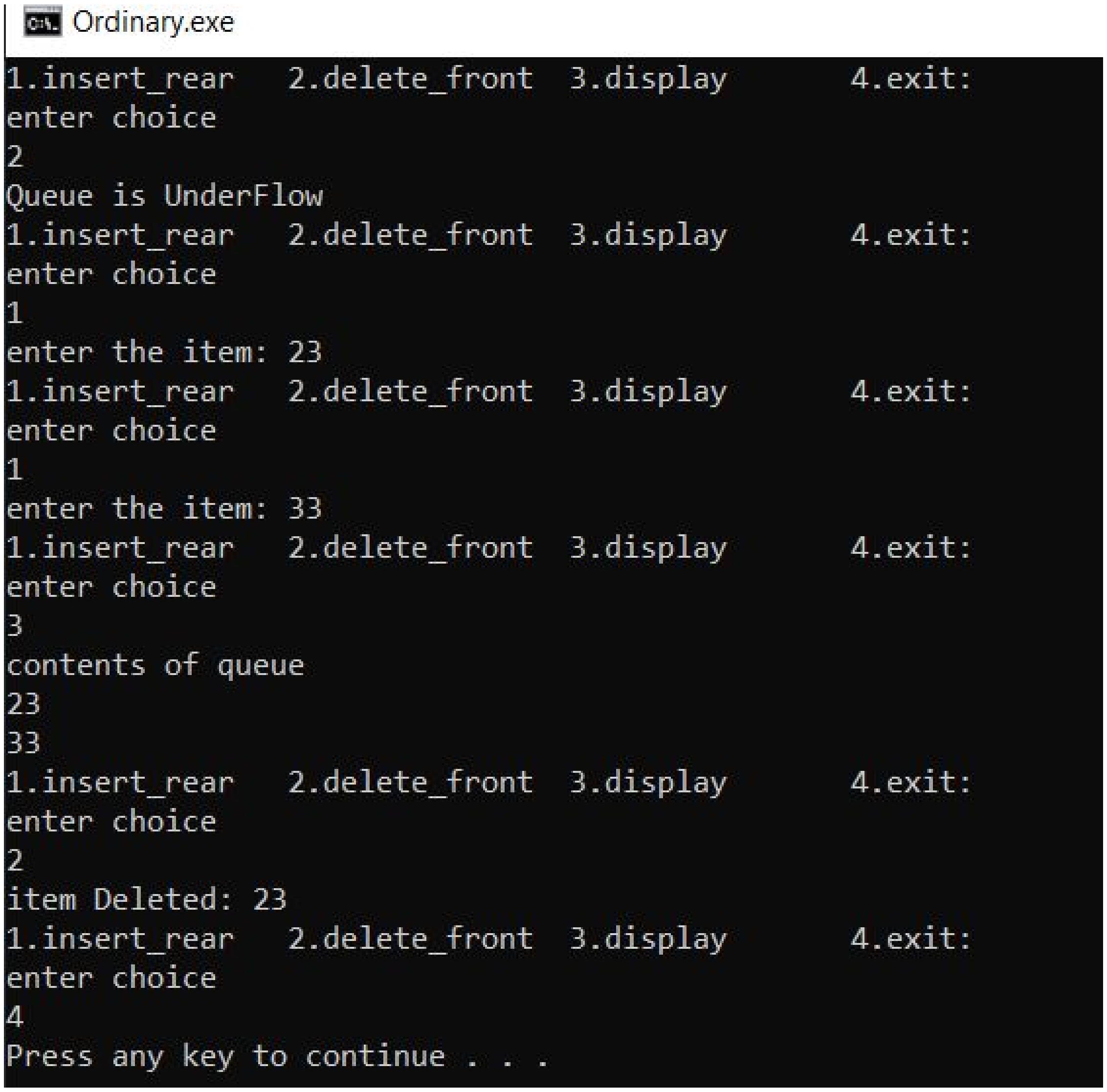


```
InfixToPostfix.exe
Enter the valid infix expression a+(b+c)+(a*r)^s
The postfix expression is :     abc++ar*s^+
Press any key to continue . . .
```

Lab Programs 3:

```
#include<stdio.h>

#include<conio.h>

#include <stdlib.h>

#define QSIZE 5

int item,front=0,rear=-1,q[10];

void insertrear(){

 if(rear ==QSIZE-1){

  printf("Queue is Overflow");

  return;

 }rear +=1;

 q[rear] = item;

}

int deletfront(){

 if(front>rear){

  front =0;
```

```
    rear =-1;
    return -1;
  }return q[front++];
}
void display(){
  int i;
  if(front> rear){
    printf("quene is empty\n");
    return;
  }
  printf("contents of queue\n");
  for(i=front;i<=rear;i++)
  printf("%d\n",q[i]);
}
void main()
{ char ch='b';
  int choice;
  for(;;){
 printf("1.insert_rear\t2.delete_front\t3.display\t4.exit:\n");
 printf("enter choice\n");
 scanf("%d",&ch);
 switch(ch)
   {
    case 1:printf("enter the item:\t");
       scanf("%d",&item);
       insertrear();
       break;
    case 2:item =deletfront();
    if(item==-1){
      printf("Queue is UnderFlow\n");break;}
      printf("item Deleted: %d \n",item);
       break;
      case 3:display();
      break;
    default:exit(0);
   } }}
```



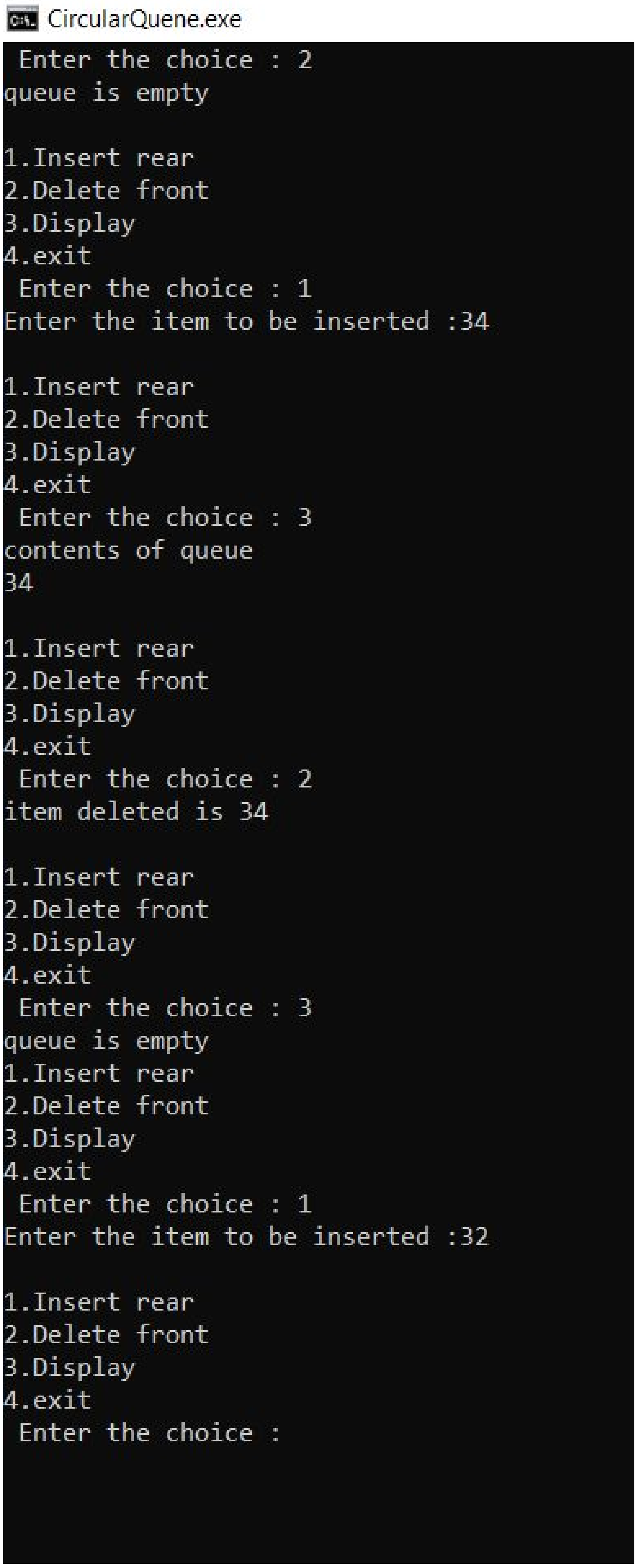
Ordinary.exe

```
1.insert_rear   2.delete_front  3.display       4.exit:
enter choice
2
Queue is UnderFlow
1.insert_rear   2.delete_front  3.display       4.exit:
enter choice
1
enter the item: 23
1.insert_rear   2.delete_front  3.display       4.exit:
enter choice
1
enter the item: 33
1.insert_rear   2.delete_front  3.display       4.exit:
enter choice
3
contents of queue
23
33
1.insert_rear   2.delete_front  3.display       4.exit:
enter choice
2
item Deleted: 23
1.insert_rear   2.delete_front  3.display       4.exit:
enter choice
4
Press any key to continue . . .
```

Lab Programs 4:

```
#include<stdio.h>
#include<stdlib.h>
#include<process.h>
#define que_size 3
int item,front=0,rear=-1,q[que_size],count=0;
void insertrear()
{
		if(count==que_size)

		{

			printf("queue overflow\n");

			return;

		}

		rear=(rear+1)%que_size;

		q[rear]=item;

		count++;

	}

	int deletefront()

	{

		if(count==0) return -1;

		item = q[front];

		front=(front+1)%que_size;

		count=count-1;

		return item;

	}

	void displayq()

	{

		int i,f;

		if(count==0)

		{

			printf("queue is empty");

			return;

		}

		f=front;

		printf("contents of queue \n");

		for(i=0;i<count;i++)

		{

			printf("%d\n",q[f]);

			//f=(f+1)%que_size;

		}
```

```
}
void main()
{
        int choice;
        for(;;)
        {
                printf("\n1.Insert rear \n2.Delete front \n3.Display \n4.exit \n ");
                printf("Enter the choice : ");
                scanf("%d",&choice);
                switch(choice)
                {
                        case 1:printf("Enter the item to be inserted :");
                            scanf("%d",&item);
                            insertrear();
                            break;
                        case 2:item=deletefront();
                                 if(item==-1)
                                 printf("queue is empty\n");
                                 else
                                 printf("item deleted is %d \n",item);
                                 break;
                   case 3:displayq();
                                 break;
                   default:exit(0);
                }
        }
}
```


CircularQuene.exe

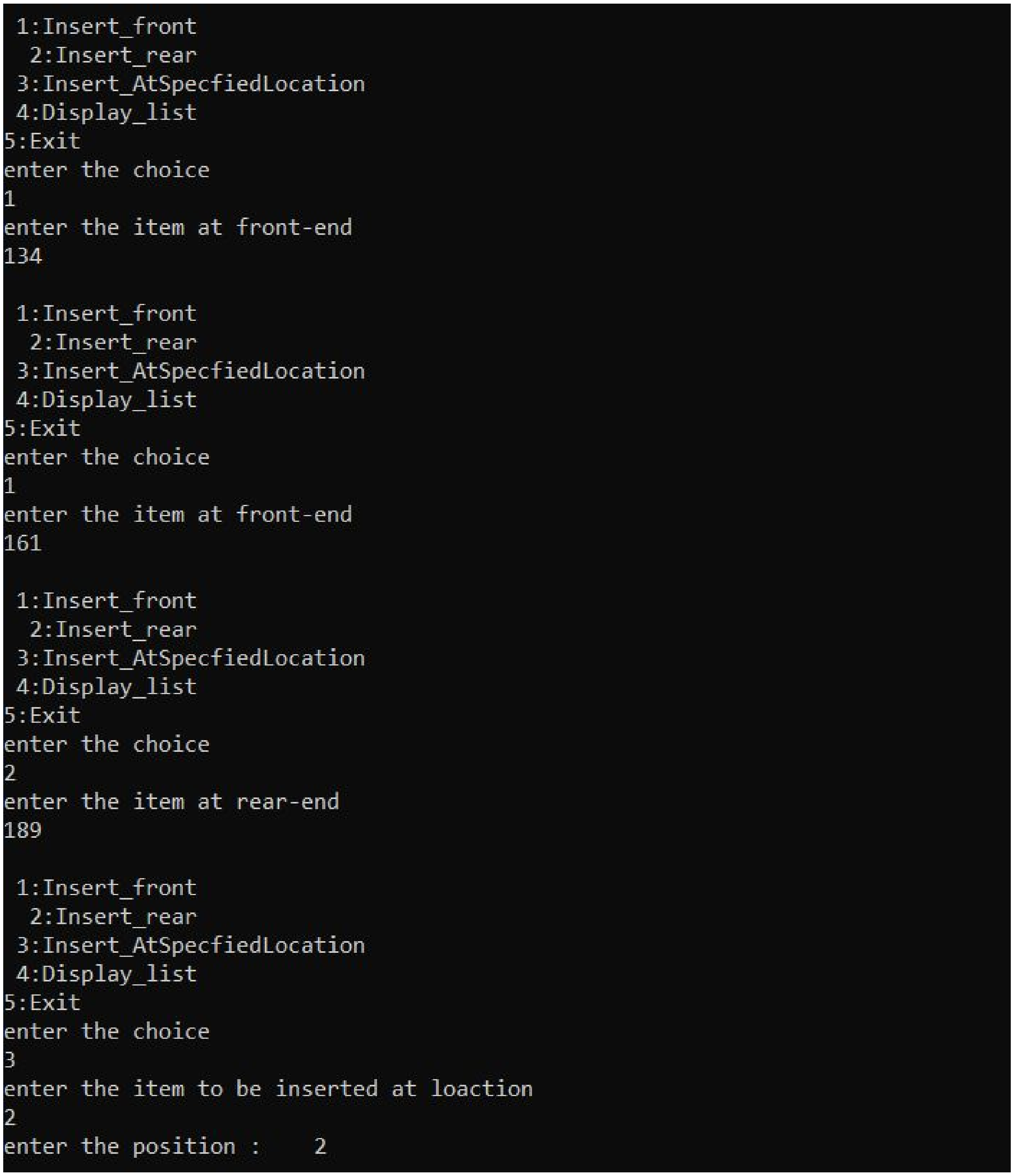
```
 Enter the choice : 2
queue is empty

1.Insert rear
2.Delete front
3.Display
4.exit
 Enter the choice : 1
Enter the item to be inserted :34

1.Insert rear
2.Delete front
3.Display
4.exit
 Enter the choice : 3
contents of queue
34

1.Insert rear
2.Delete front
3.Display
4.exit
 Enter the choice : 2
item deleted is 34

1.Insert rear
2.Delete front
3.Display
4.exit
 Enter the choice : 3
queue is empty
1.Insert rear
2.Delete front
3.Display
4.exit
 Enter the choice : 1
Enter the item to be inserted :32

1.Insert rear
2.Delete front
3.Display
4.exit
 Enter the choice :
```

Lab Programs 5:

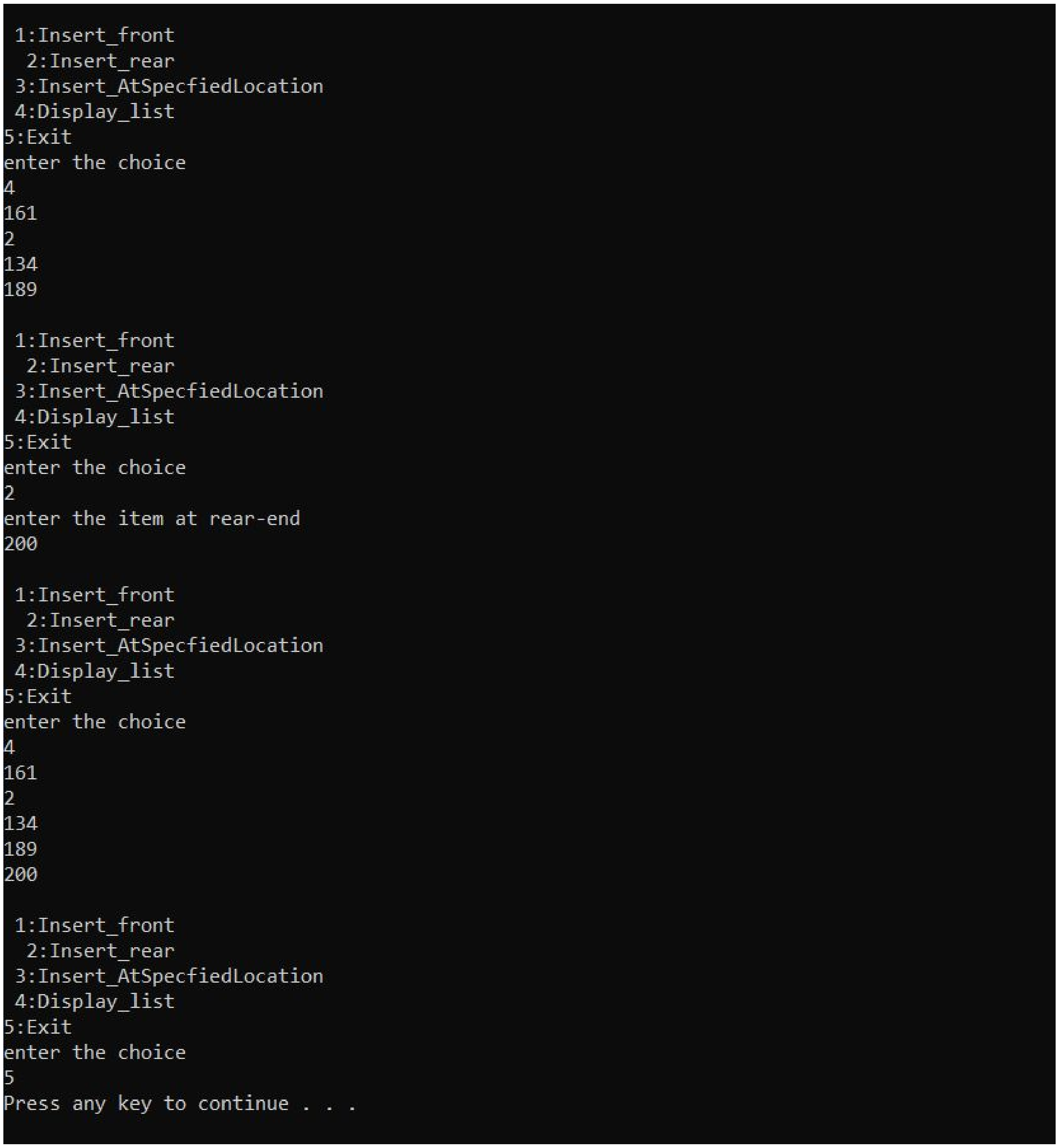
```
#include<stdio.h>

#include <conio.h>

#include<stdlib.h>

#include <process.h>

struct node

{

int info;

struct node *link;

};

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_front(NODE first,int item)

{

NODE temp;
```

```
temp=getnode();
temp->info=item;
temp->link=NULL;
if(first==NULL)
return temp;
temp->link=first;
first=temp;
return first;
}
    NODE insert_pos(int item,int pos,NODE first)
    {
    NODE temp;
    NODE prev,cur;
    int count;
    temp=getnode();
    temp->info=item;
    temp->link=NULL;
    if(first==NULL && pos==1)
    return temp;
    if(first==NULL)
    {
     printf("invalid pos\n");
     return first;
    }
    if(pos==1)
    {
    temp->link=first;
    return temp;
    }
    count=1;
    prev=NULL;
    cur=first;
    while(cur!=NULL && count!=pos)
    {
     prev=cur;
     cur=cur->link;
     count++;
    }
    if(count==pos)
    {
    prev->link=temp;
    temp->link=cur;
    return first;
    }
    else
    printf("Invailed position ,item cannot be inserted\n");
    return first;
    }
    NODE insert_rear(NODE first,int item)
    {
    NODE temp,cur;
    temp=getnode();
    temp->info=item;
    temp->link=NULL;
    if(first==NULL)
    return temp;
    cur=first;
    while(cur->link!=NULL)
    cur=cur->link;
    cur->link=temp;
    return first;
    }
void display(NODE first)
{
```

```
NODE temp;
if(first==NULL)
printf("list empty cannot display items\n");
for(temp=first;temp!=NULL;temp=temp->link)
{
printf("%d\n",temp->info);
}
}
void main()
{
int item,choice,pos;
NODE first=NULL;
for(;;)
{
printf("1:Insert_front\t2:Insert_rear\t3:Insert_AtSpecfiedLocation\t4:Display_list\t5:Exit\n");
printf("enter the choice\n");
scanf("%d",&choice);
switch(choice)
{
case 1:printf("enter the item at front-end\n");
scanf("%d",&item);
first=insert_front(first,item);
break;
case 2:printf("enter the item at rear-end\n");
scanf("%d",&item);
first=insert_rear(first,item);
break;
case 3: printf("enter the item to be inserted at loaction\n");
scanf("%d",&item);
printf("enter the position :\t");
int pos ;
scanf("%d",&pos);
first = insert_pos(item,pos,first);
break;
case 4:display(first);
break;
default:exit(0);
break;
}
}
getch();
}
```



```
 1:Insert_front
  2:Insert_rear
 3:Insert_AtSpecfiedLocation
 4:Display_list
5:Exit
enter the choice
1
enter the item at front-end
134

 1:Insert_front
  2:Insert_rear
 3:Insert_AtSpecfiedLocation
 4:Display_list
5:Exit
enter the choice
1
enter the item at front-end
161

 1:Insert_front
  2:Insert_rear
 3:Insert_AtSpecfiedLocation
 4:Display_list
5:Exit
enter the choice
2
enter the item at rear-end
189

 1:Insert_front
  2:Insert_rear
 3:Insert_AtSpecfiedLocation
 4:Display_list
5:Exit
enter the choice
3
enter the item to be inserted at loaction
2
enter the position :    2
```



```
 1:Insert_front
  2:Insert_rear
 3:Insert_AtSpecfiedLocation
 4:Display_list
5:Exit
enter the choice
4
161
2
134
189

 1:Insert_front
  2:Insert_rear
 3:Insert_AtSpecfiedLocation
 4:Display_list
5:Exit
enter the choice
2
enter the item at rear-end
200

 1:Insert_front
  2:Insert_rear
 3:Insert_AtSpecfiedLocation
 4:Display_list
5:Exit
enter the choice
4
161
2
134
189
200

 1:Insert_front
  2:Insert_rear
 3:Insert_AtSpecfiedLocation
 4:Display_list
5:Exit
enter the choice
5
Press any key to continue . . .
```

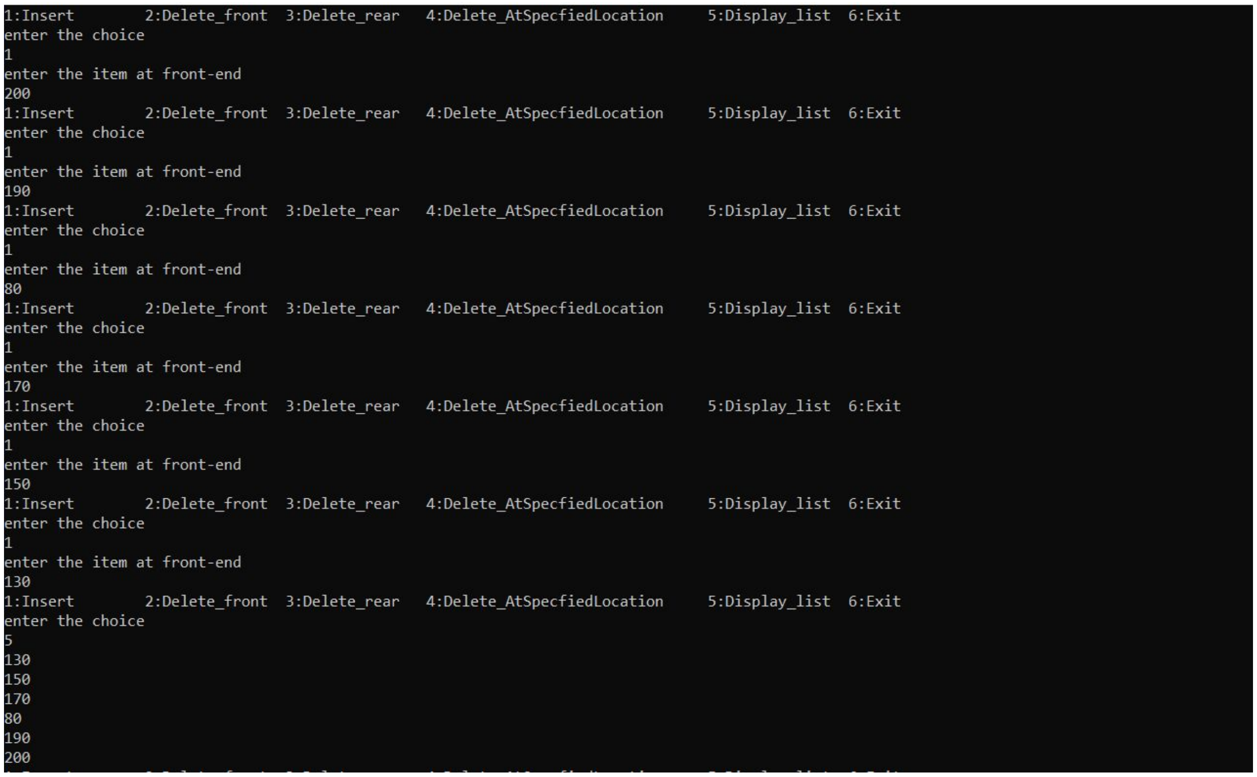
Lab Programs 6:

```
#include<stdio.h>

#include <conio.h>

#include<stdlib.h>

#include <process.h>

struct node

{

int info;
```

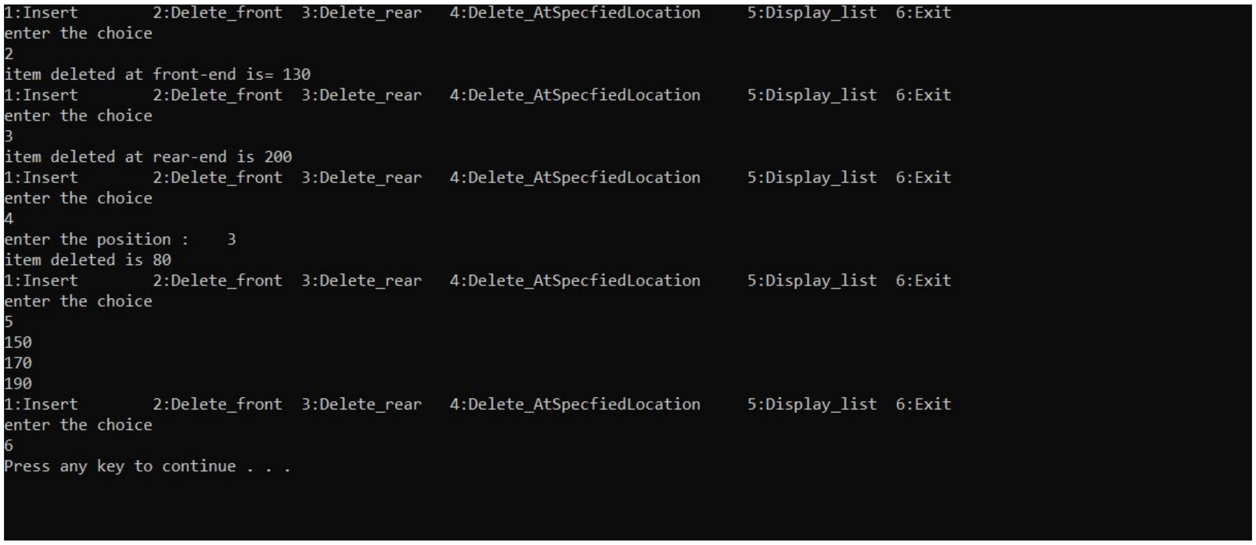
```
struct node *link;
};
typedef struct node *NODE;
NODE getnode()
{
NODE x;
x=(NODE)malloc(sizeof(struct node));
if(x==NULL)
{
printf("memory full\n");
exit(0);
}
return x;
}
void freenode(NODE x)
{
free(x);
}
NODE insert_front(NODE first,int item)
{
NODE temp;
temp=getnode();
temp->info=item;
temp->link=NULL;
if(first==NULL)
return temp;
temp->link=first;
first=temp;
return first;
}

NODE delete_front(NODE first)
{
```

```
NODE temp;
if(first==NULL)
{
printf("list is empty cannot delete\n");
return first;
}
temp=first;
temp=temp->link;
printf("item deleted at front-end is= %d\n",first->info);
free(first);
return temp;
}
NODE delete_rear(NODE first)
{
NODE cur,prev;
if(first==NULL)
{
printf("list is empty cannot delete\n");
return first;
}
if(first->link==NULL)
{
printf("item deleted is %d\n",first->info);
free(first);
return NULL;
}
prev=NULL;
cur=first;
while(cur->link!=NULL)
{
prev=cur;
cur=cur->link;
}
```

```
printf("item deleted at rear-end is %d\n",cur->info);
free(cur);
prev->link=NULL;
return first;
}
NODE delete_pos(int pos,NODE first){
  NODE prev,cur;
  int count;
  if(first==NULL)
  {
  printf("list is empty cannot delete And invalid position\n");
  return first;}
if(first->link==NULL && pos==1)
  {
  printf("item deleted is %d\n",first->info);
  free(first);
  return NULL;
  }count=1;
  prev=NULL;
  cur=first;
  while(cur!=NULL && count!=pos)
  {
   prev=cur;
   cur=cur->link;
   count++;
  }
  if(count==pos)
  {
  prev->link=cur->link;
  printf("item deleted is %d\n",cur->info);
  free(cur);
  return first;
  }
  else
   printf("Invalid position.\n");
  return first;
  }



void display(NODE first)
{
NODE temp;
if(first==NULL)
printf("list empty cannot display items\n");
for(temp=first;temp!=NULL;temp=temp->link)
{
printf("%d\n",temp->info);
}
}
void main()
{
int item,choice,pos;
NODE first=NULL;
for(;;)
{
printf("1:Insert\t2:Delete_front\t3:Delete_rear\t4:Delete_AtSpecfiedLocation\t5:Display_list\t6:Exit\n");
printf("enter the choice\n");
scanf("%d",&choice);
switch(choice)
{
case 1:printf("enter the item at front-end\n");
scanf("%d",&item);
first=insert_front(first,item);
break;
case 2:first=delete_front(first);
break;
case 3:first=delete_rear(first);
break;
case 4:printf("enter the position :\t");
    int pos1 ;
    scanf("%d",&pos1);
   first = delete_pos(pos1,first);
    break;

case 5:display(first);
break;
default:exit(0);
break;
}}}
```



```
1:Insert        2:Delete_front  3:Delete_rear   4:Delete_AtSpecfiedLocation     5:Display_list  6:Exit
enter the choice
1
enter the item at front-end
200
1:Insert        2:Delete_front  3:Delete_rear   4:Delete_AtSpecfiedLocation     5:Display_list  6:Exit
enter the choice
1
enter the item at front-end
190
1:Insert        2:Delete_front  3:Delete_rear   4:Delete_AtSpecfiedLocation     5:Display_list  6:Exit
enter the choice
1
enter the item at front-end
80
1:Insert        2:Delete_front  3:Delete_rear   4:Delete_AtSpecfiedLocation     5:Display_list  6:Exit
enter the choice
1
enter the item at front-end
170
1:Insert        2:Delete_front  3:Delete_rear   4:Delete_AtSpecfiedLocation     5:Display_list  6:Exit
enter the choice
1
enter the item at front-end
150
1:Insert        2:Delete_front  3:Delete_rear   4:Delete_AtSpecfiedLocation     5:Display_list  6:Exit
enter the choice
1
enter the item at front-end
130
1:Insert        2:Delete_front  3:Delete_rear   4:Delete_AtSpecfiedLocation     5:Display_list  6:Exit
enter the choice
5
130
150
170
80
190
200
```



```
1:Insert        2:Delete_front  3:Delete_rear   4:Delete_AtSpecfiedLocation     5:Display_list  6:Exit
enter the choice
2
item deleted at front-end is= 130
1:Insert        2:Delete_front  3:Delete_rear   4:Delete_AtSpecfiedLocation     5:Display_list  6:Exit
enter the choice
3
item deleted at rear-end is 200
1:Insert        2:Delete_front  3:Delete_rear   4:Delete_AtSpecfiedLocation     5:Display_list  6:Exit
enter the choice
4
enter the position :    3
item deleted is 80
1:Insert        2:Delete_front  3:Delete_rear   4:Delete_AtSpecfiedLocation     5:Display_list  6:Exit
enter the choice
5
150
170
190
1:Insert        2:Delete_front  3:Delete_rear   4:Delete_AtSpecfiedLocation     5:Display_list  6:Exit
enter the choice
6
Press any key to continue . . .
```

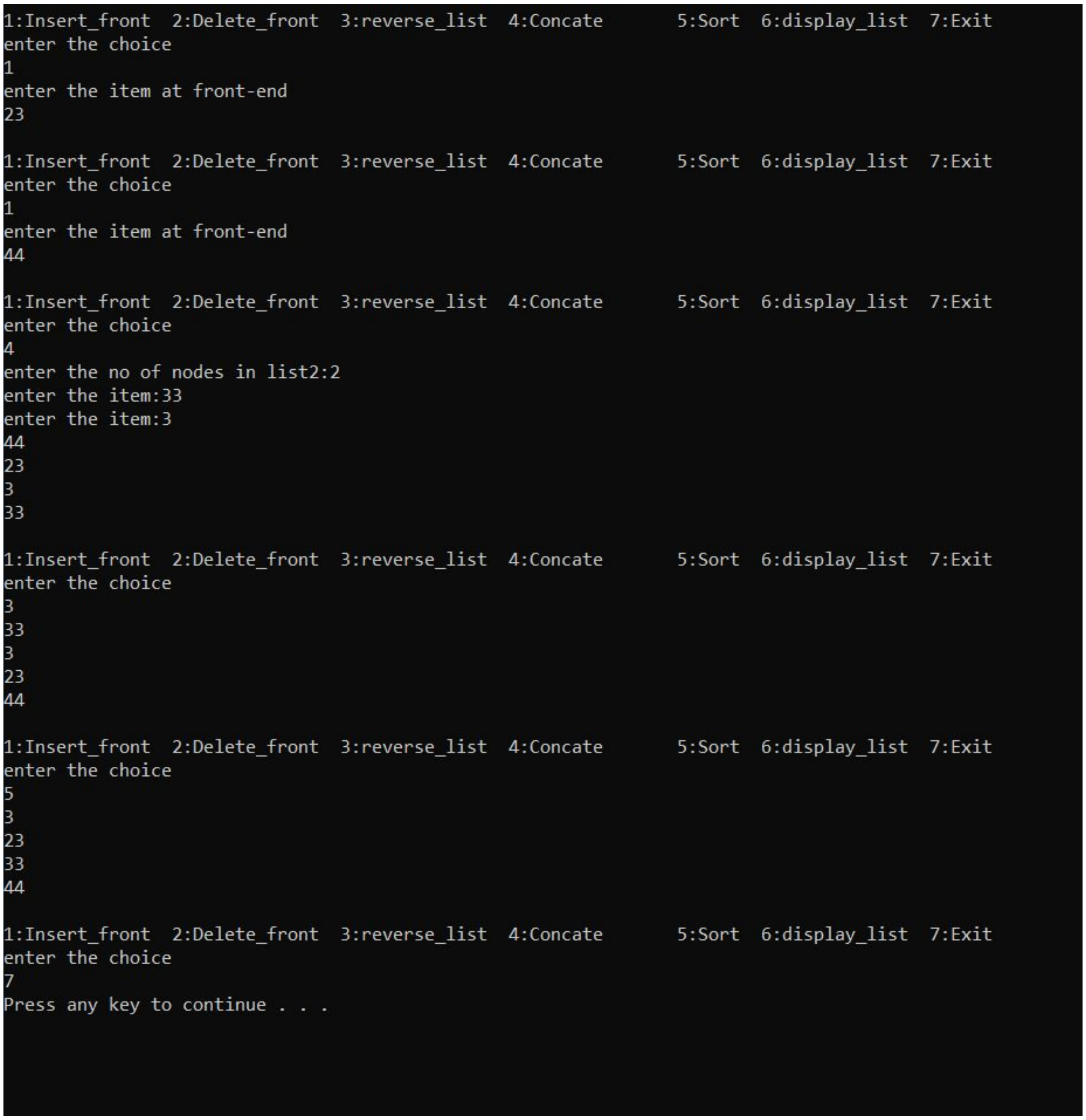
Lab Programs 7:

```
#include<stdio.h>

#include <conio.h>

#include<stdlib.h>

#include <process.h>

struct node

{

int info;
struct node *link;

};

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_front(NODE first,int item)

{

NODE temp;

temp=getnode();

temp->info=item;

temp->link=NULL;

if(first==NULL)

return temp;

temp->link=first;

first=temp;

return first;

}


NODE delete_front(NODE first)
```

```
{
NODE temp;
if(first==NULL)
{
printf("list is empty cannot delete\n");
return first;
}
temp=first;
temp=temp->link;
printf("item deleted at front-end is= %d\n",first->info);
free(first);
return temp;
}
NODE reverse(NODE first)
 {
 NODE cur,temp;
 cur=NULL;
 while(first!=NULL)
  {
   temp=first;
   first=first->link;
   temp->link=cur;
   cur=temp;
  }
 return cur;
}
NODE concat(NODE first,NODE second)
{
 NODE cur;
 if(first==NULL)
  return second;
 if(second==NULL)
```

```
  return first;
 cur=first;
 while(cur->link!=NULL)
  cur=cur->link;
 cur->link=second;
 return first;
}
void display(NODE first)
{
NODE temp;
if(first==NULL)
printf("list empty cannot display items\n");
for(temp=first;temp!=NULL;temp=temp->link)
{
printf("%d\n",temp->info);
}
}
NODE sortList(NODE first) {
        NODE current = first, index = NULL;
        int temp;

        if(first == NULL) {
              printf("list is empty.");
           return current;
        }
        else {
           while(current != NULL) {

               index = current->link;

               while(index != NULL) {
                if(current->info > index->info) {
                    temp = current->info;
                    current->info = index->info;
                    index->info = temp;
                }
                index = index->link;
            }
            current = current->link;
        }
                              return current;
    }
  }
void main()
{
int item,choice,pos,n,i;
NODE first=NULL,a,b;
for(;;)
{
printf("\n1:Insert_front\t2:Delete_front\t3:reverse_list\t4:Concate\t5:Sort\t6:display_list\t7:Exit\n");
printf("enter the choice\n");
scanf("%d",&choice);
switch(choice)
{
case 1:printf("enter the item at front-end\n");
scanf("%d",&item);
first=insert_front(first,item);
break;
case 2:first=delete_front(first);
break;
case 3: first=reverse(first); display(first);break;
 case 4:
 if(first==NULL){
```

```
 printf("enter the no of nodes in 1:");
          scanf("%d",&n);
          a=NULL;
          for(i=0;i<n;i++)
           {
            printf("enter the item:");
            scanf("%d",&item);
            a=insert_front(a,item);
          }}else{
            a=first;
          }
           printf("enter the no of nodes in list2:");
          scanf("%d",&n);
          b=NULL;
          for(i=0;i<n;i++)
           {
            printf("enter the item:");
            scanf("%d",&item);
            b=insert_front(b,item);
           }
           a=concat(a,b);
           display(a);
          break;
case 5:sortList(first);
                              display(first);
         break;
case 6:display(first);
break;
default:for(;first->link!=NULL;first=first->link)free(first);
exit(0);
break;}}}
```



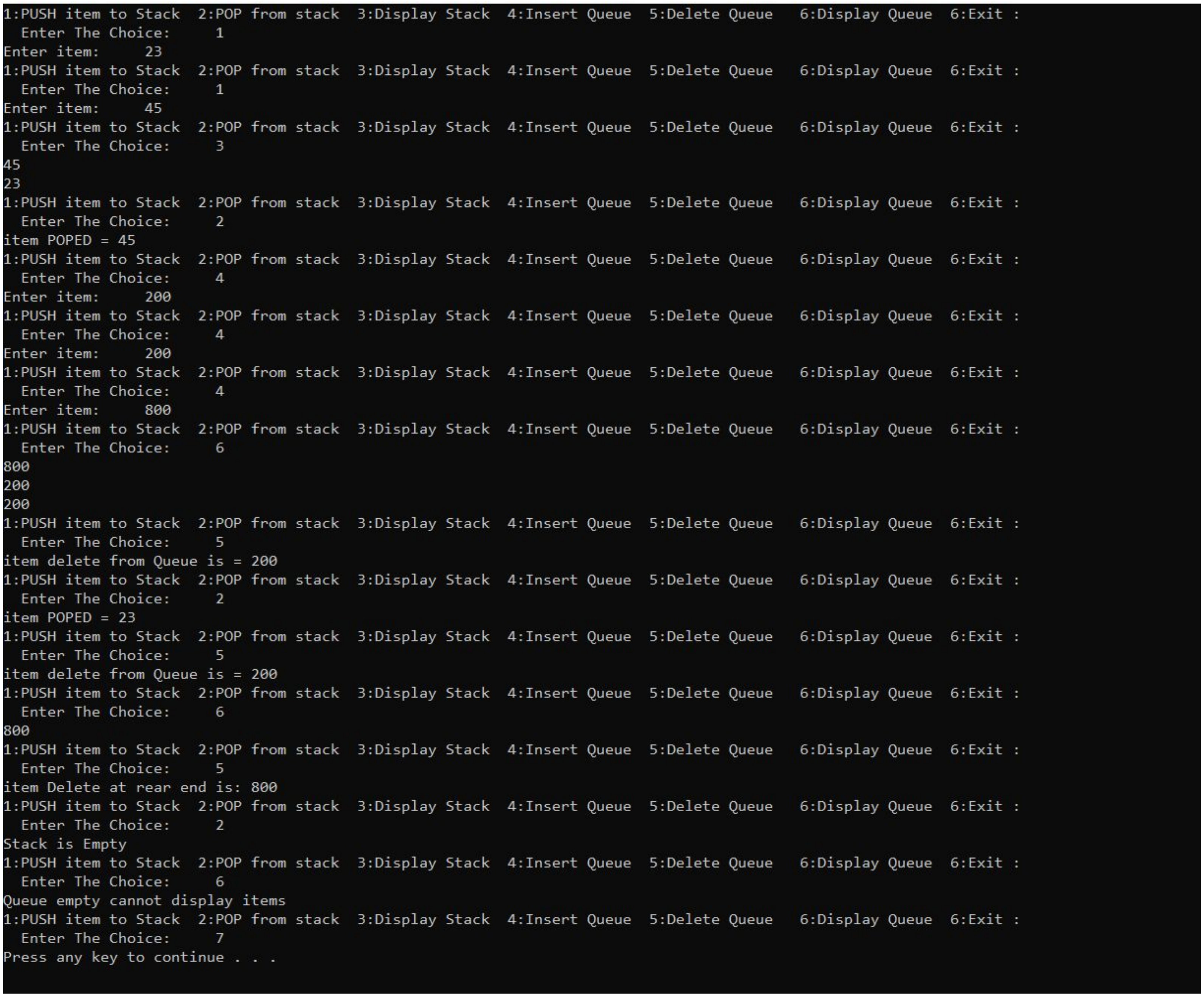
```
1:Insert_front  2:Delete_front  3:reverse_list  4:Concate       5:Sort  6:display_list  7:Exit
enter the choice
1
enter the item at front-end
23

1:Insert_front  2:Delete_front  3:reverse_list  4:Concate       5:Sort  6:display_list  7:Exit
enter the choice
1
enter the item at front-end
44

1:Insert_front  2:Delete_front  3:reverse_list  4:Concate       5:Sort  6:display_list  7:Exit
enter the choice
4
enter the no of nodes in list2:2
enter the item:33
enter the item:3
44
23
3
33

1:Insert_front  2:Delete_front  3:reverse_list  4:Concate       5:Sort  6:display_list  7:Exit
enter the choice
3
33
3
23
44

1:Insert_front  2:Delete_front  3:reverse_list  4:Concate       5:Sort  6:display_list  7:Exit
enter the choice
5
3
23
33
44

1:Insert_front  2:Delete_front  3:reverse_list  4:Concate       5:Sort  6:display_list  7:Exit
enter the choice
7
Press any key to continue . . .
```

Lab Programs 8:

```
#include<stdio.h>

#include<stdlib.h>

#include<math.h>

#include<conio.h>

#include<process.h>

struct node{

struct   node *link;

  int info;
```

```
};

typedef struct node *NODE;

NODE freenode(NODE x){

  free(x);

}

NODE getnode(){

  NODE x = (NODE)malloc(sizeof(struct node));

  if(x==NULL){

    printf("Memory is full\n");

    exit(0);

  }

  return x;

}

NODE insertfront(NODE first,int item){

  NODE temp =getnode();

  temp->info = item;

  temp->link = NULL;

  if(first == NULL){

    return temp;

  }

  temp->link = first;

  first = temp;

  return first;

}


NODE deletefront(NODE first){

  if(first ==NULL){

    printf("Stack is Empty\n");

    return first;

  }

  NODE temp = first;

  first = first->link;
```

```
 printf("item POPED = %d\n",temp->info);
 freenode(temp);
 return first;
}
NODE deleterear(NODE first){
 NODE prev,curr;
 if(first == NULL){
  printf("Queue Empty\n");
  return first;
 }
 if(first->link == NULL){
  printf("item Delete at rear end is: %d\n",first->info);
  free(first);
  return NULL;
 }
 curr = first;
 prev = NULL;
 while(curr->link != NULL){
  prev = curr;
  curr = curr->link ;
 }
 prev->link  = NULL;
 printf("item delete from Queue is = %d\n",curr->info);
 freenode(curr);
 return first;
}
void display(NODE first){
NODE temp;
for(temp=first;temp!=NULL;temp=temp->link){
printf("%d\n",temp->info);
}}
int main(){
  int item,choice;

  NODE first =NULL,first2 =NULL;

  for(;;){

    printf("1:PUSH item to Stack  2:POP from stack  3:Display Stack  4:Insert Queue  5:Delete Queue
6:Display Queue  6:Exit : \n  ");

     printf("Enter The Choice: \t");

    scanf("%d",&choice);

    switch(choice){

     case 1 : printf("Enter item:\t");

              scanf("%d",&item);

             first= insertfront(first,item); break;

     case 2 :first=deletefront(first);break;

     case 3 :  if(first==NULL)

               printf("Stack empty cannot display items\n");

               else  display(first); break;

     case 4: printf("Enter item:\t");

              scanf("%d",&item);

              first2 = insertfront(first2,item);break;

    case 5: first2 = deleterear(first2);

                break;

    case 6 : if(first2 ==NULL)

              printf("Queue empty cannot display items\n");

                 else display(first2);break;

     default :    exit(1);break; }}}
```



```
1:PUSH item to Stack  2:POP from stack  3:Display Stack  4:Insert Queue  5:Delete Queue   6:Display Queue  6:Exit :
  Enter The Choice:     1
Enter item:     23
1:PUSH item to Stack  2:POP from stack  3:Display Stack  4:Insert Queue  5:Delete Queue   6:Display Queue  6:Exit :
  Enter The Choice:     1
Enter item:     45
1:PUSH item to Stack  2:POP from stack  3:Display Stack  4:Insert Queue  5:Delete Queue   6:Display Queue  6:Exit :
  Enter The Choice:     3
45
23
1:PUSH item to Stack  2:POP from stack  3:Display Stack  4:Insert Queue  5:Delete Queue   6:Display Queue  6:Exit :
  Enter The Choice:     2
item POPED = 45
1:PUSH item to Stack  2:POP from stack  3:Display Stack  4:Insert Queue  5:Delete Queue   6:Display Queue  6:Exit :
  Enter The Choice:     4
Enter item:     200
1:PUSH item to Stack  2:POP from stack  3:Display Stack  4:Insert Queue  5:Delete Queue   6:Display Queue  6:Exit :
  Enter The Choice:     4
Enter item:     200
1:PUSH item to Stack  2:POP from stack  3:Display Stack  4:Insert Queue  5:Delete Queue   6:Display Queue  6:Exit :
  Enter The Choice:     4
Enter item:     800
1:PUSH item to Stack  2:POP from stack  3:Display Stack  4:Insert Queue  5:Delete Queue   6:Display Queue  6:Exit :
  Enter The Choice:     6
800
200
200
1:PUSH item to Stack  2:POP from stack  3:Display Stack  4:Insert Queue  5:Delete Queue   6:Display Queue  6:Exit :
  Enter The Choice:     5
item delete from Queue is = 200
1:PUSH item to Stack  2:POP from stack  3:Display Stack  4:Insert Queue  5:Delete Queue   6:Display Queue  6:Exit :
  Enter The Choice:     2
item POPED = 23
1:PUSH item to Stack  2:POP from stack  3:Display Stack  4:Insert Queue  5:Delete Queue   6:Display Queue  6:Exit :
  Enter The Choice:     5
item delete from Queue is = 200
1:PUSH item to Stack  2:POP from stack  3:Display Stack  4:Insert Queue  5:Delete Queue   6:Display Queue  6:Exit :
  Enter The Choice:     6
800
1:PUSH item to Stack  2:POP from stack  3:Display Stack  4:Insert Queue  5:Delete Queue   6:Display Queue  6:Exit :
  Enter The Choice:     5
item Delete at rear end is: 800
1:PUSH item to Stack  2:POP from stack  3:Display Stack  4:Insert Queue  5:Delete Queue   6:Display Queue  6:Exit :
  Enter The Choice:     2
Stack is Empty
1:PUSH item to Stack  2:POP from stack  3:Display Stack  4:Insert Queue  5:Delete Queue   6:Display Queue  6:Exit :
  Enter The Choice:     6
Queue empty cannot display items
1:PUSH item to Stack  2:POP from stack  3:Display Stack  4:Insert Queue  5:Delete Queue   6:Display Queue  6:Exit :
  Enter The Choice:     7
Press any key to continue . . .
```

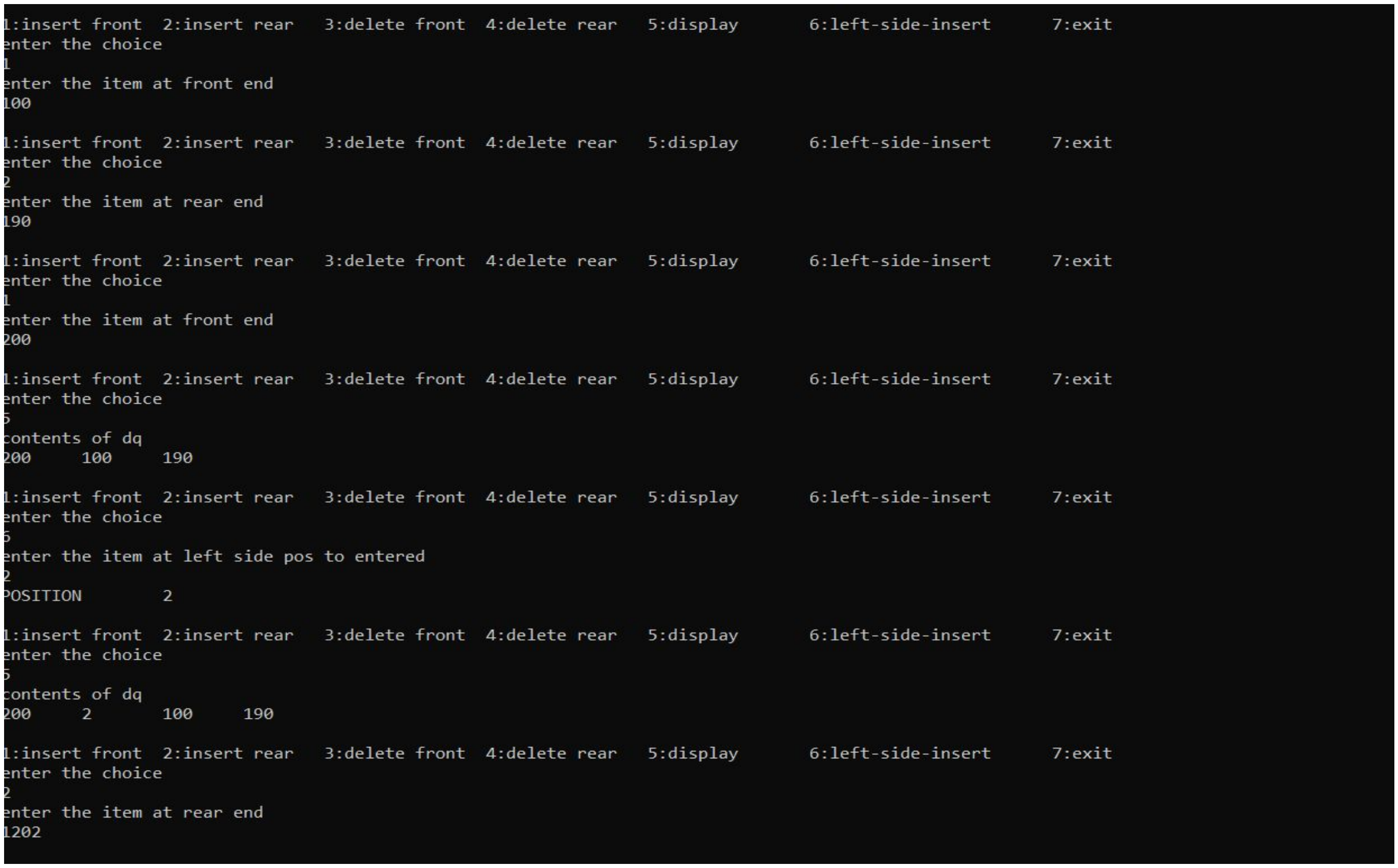
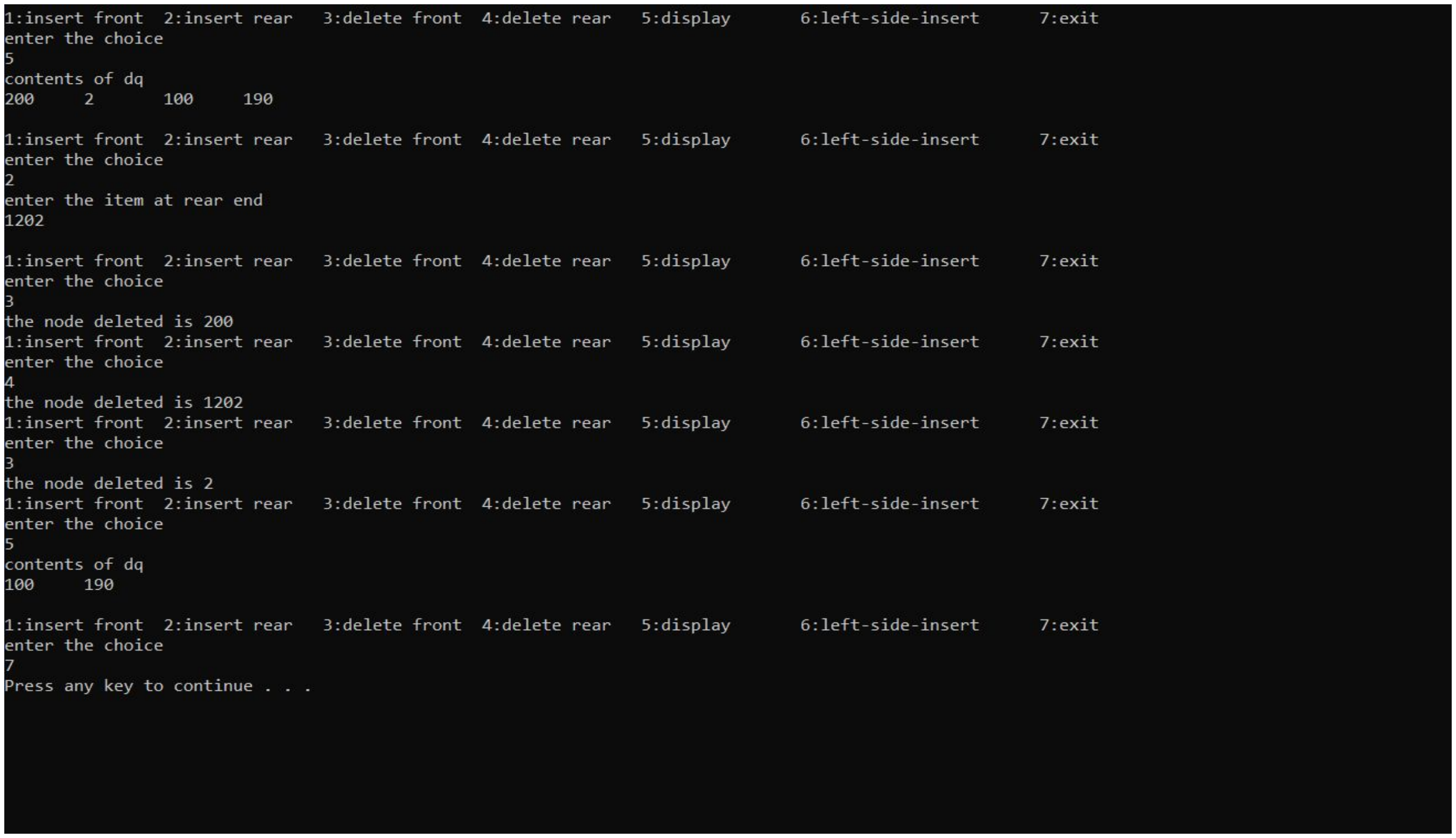
Lab Programs 9:

```
#include<stdio.h>

#include<conio.h>

#include<process.h>

#include<stdlib.h>

struct node

{

        int info;
```

```
            struct node *llink;

            struct node *rlink;

            };

typedef struct node *NODE;

NODE getnode()

{

        NODE x;

        x=(NODE)malloc(sizeof(struct node));

        if(x==NULL)

        {

                printf("mem full\n");

                exit(0);

                }

        return x;

        }

void freenode(NODE x)

{

        free(x);

}

NODE dinsert_front(int item,NODE head)

{

NODE temp,cur;

temp=getnode();

temp->info=item;

cur=head->rlink;

head->rlink=temp;

temp->llink=head;

temp->rlink=cur;

cur->llink=temp;

return head;

}

NODE dinsert_leftpos(int item,NODE head ,int pos){
 NODE temp,cur,perv;temp=getnode();temp->info=item;
 int i=1;
 cur=head->rlink;
 perv=NULL;
 while(i<pos && cur!=head){
   perv =cur;
 cur=cur->rlink;i++;
 }
 if(cur==head)
 {
  printf("POSITION not found\n");
  return head;
  }
 perv ->rlink=temp;
 temp->rlink=cur;
 temp->llink=perv;
 cur->llink =temp;
 return head;
}
NODE dinsert_rear(int item,NODE head)
{
NODE temp,cur;
temp=getnode();
temp->info=item;
cur=head->llink;
head->llink=temp;
temp->rlink=head;
temp->llink=cur;
cur->rlink=temp;
return head;
}
NODE ddelete_front(NODE head)
```

```
{
NODE cur,next;
if(head->rlink==head)
{
printf("dq empty\n");
return head;
}
cur=head->rlink;
next=cur->rlink;
head->rlink=next;
next->llink=head;
printf("the node deleted is %d",cur->info);
freenode(cur);
return head;
}
NODE ddelete_rear(NODE head)
{
NODE cur,prev;
if(head->rlink==head)
{
printf("dq empty\n");
return head;
}
cur=head->llink;
prev=cur->llink;
head->llink=prev;
prev->rlink=head;
printf("the node deleted is %d",cur->info);
freenode(cur);
return head;
}
void display(NODE head)
```

```
{
NODE temp;
if(head->rlink==head)
{
printf("dq empty\n");
return;
}
printf("contents of dq\n");
temp=head->rlink;
while(temp!=head)
{
printf("%d \t",temp->info);
temp=temp->rlink;
}
printf("\n");
}
void main()
{
NODE head,last;
int item,pos, choice;
head=getnode();
head->rlink=head;
head->llink=head;

for(;;)
{
        printf("\n1:insert front\t2:insert rear\t3:delete front\t4:delete
rear\t5:display\t6:left-side-insert\t7:exit\n");
        printf("enter the choice\n");
        scanf("%d",&choice);
        switch(choice)
        {
                case 1: printf("enter the item at front end\n");
                        scanf("%d",&item);
                        last=dinsert_front(item,head);
                        break;
                case 2: printf("enter the item at rear end\n");
                        scanf("%d",&item);
                        last=dinsert_rear(item,head);
                        break;
                case 3:last=ddelete_front(head);
                        break;
                case 4: last=ddelete_rear(head);
                        break;
                case 5: display(head);
                        break;
case 6:  printf("enter the item at left side pos to entered\n");
                        scanf("%d",&item);
 printf("POSITION\t");
                        scanf("%d",&pos);
                        last=dinsert_leftpos(item,head,pos);
                        break;
                default:exit(0);
                }}}
```


```
1:insert front  2:insert rear   3:delete front  4:delete rear   5:display       6:left-side-insert      7:exit
enter the choice
1
enter the item at front end
100

1:insert front  2:insert rear   3:delete front  4:delete rear   5:display       6:left-side-insert      7:exit
enter the choice
2
enter the item at rear end
190

1:insert front  2:insert rear   3:delete front  4:delete rear   5:display       6:left-side-insert      7:exit
enter the choice
1
enter the item at front end
200

1:insert front  2:insert rear   3:delete front  4:delete rear   5:display       6:left-side-insert      7:exit
enter the choice
5
contents of dq
200     100     190

1:insert front  2:insert rear   3:delete front  4:delete rear   5:display       6:left-side-insert      7:exit
enter the choice
6
enter the item at left side pos to entered
2
POSITION        2

1:insert front  2:insert rear   3:delete front  4:delete rear   5:display       6:left-side-insert      7:exit
enter the choice
5
contents of dq
200     2       100     190

1:insert front  2:insert rear   3:delete front  4:delete rear   5:display       6:left-side-insert      7:exit
enter the choice
2
enter the item at rear end
1202
```

```
1:insert front  2:insert rear   3:delete front  4:delete rear   5:display       6:left-side-insert      7:exit
enter the choice
5
contents of dq
200     2       100     190

1:insert front  2:insert rear   3:delete front  4:delete rear   5:display       6:left-side-insert      7:exit
enter the choice
2
enter the item at rear end
1202

1:insert front  2:insert rear   3:delete front  4:delete rear   5:display       6:left-side-insert      7:exit
enter the choice
3
the node deleted is 200
1:insert front  2:insert rear   3:delete front  4:delete rear   5:display       6:left-side-insert      7:exit
enter the choice
4
the node deleted is 1202
1:insert front  2:insert rear   3:delete front  4:delete rear   5:display       6:left-side-insert      7:exit
enter the choice
3
the node deleted is 2
1:insert front  2:insert rear   3:delete front  4:delete rear   5:display       6:left-side-insert      7:exit
enter the choice
5
contents of dq
100     190

1:insert front  2:insert rear   3:delete front  4:delete rear   5:display       6:left-side-insert      7:exit
enter the choice
7
Press any key to continue . . .
```

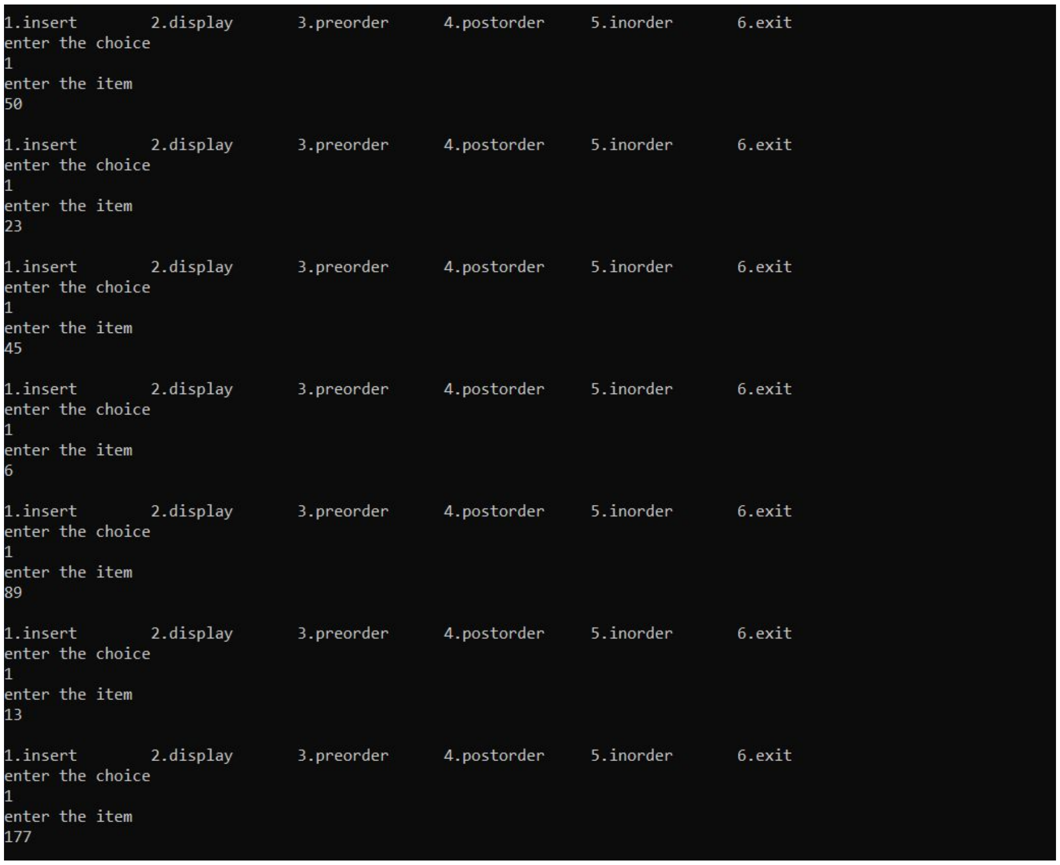
Lab Program 10:

```
#include<stdio.h>

#include<conio.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("mem full\n");

  exit(0);

 }

 return x;

}

void freenode(NODE x)

{

free(x);

}

NODE insert(NODE root,int item)

{

NODE temp,cur,prev;

temp=getnode();
```

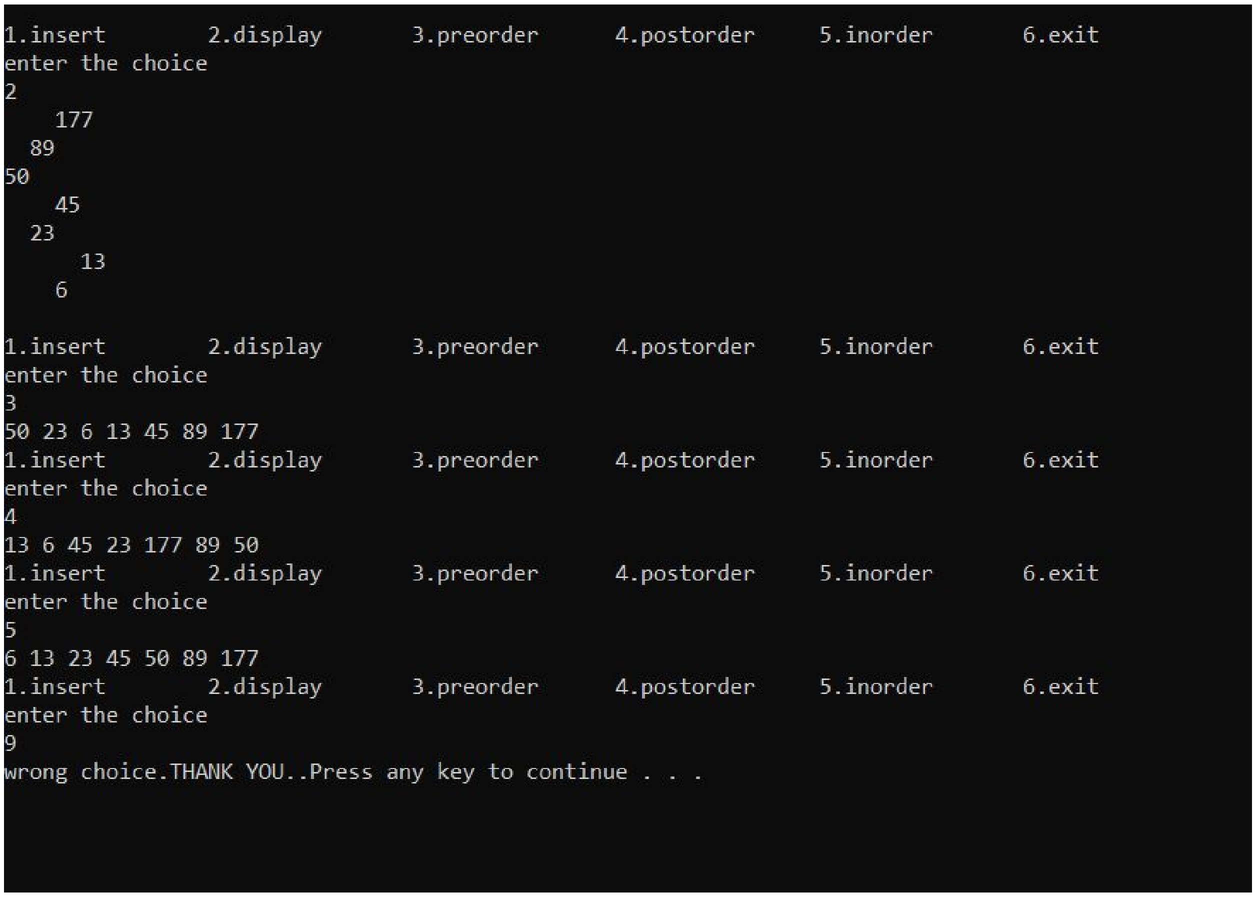
```
temp->rlink=NULL;
temp->llink=NULL;
temp->info=item;
if(root==NULL)
 return temp;
prev=NULL;
cur=root;
while(cur!=NULL)
{
prev=cur;
cur=(item<cur->info)?cur->llink:cur->rlink;
}
if(item<prev->info)
 prev->llink=temp;
else
 prev->rlink=temp;
return root;
}
void display(NODE root,int i)
{
int j;
if(root!=NULL)
 {
  display(root->rlink,i+1);
  for(j=0;j<i;j++)
                printf("  ");
   printf("%d\n",root->info);
               display(root->llink,i+1);
 }
}
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\t2.display\t3.preorder\t4.postorder\t5.inorder\t7.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:display(root,0);
                 break;
  case 3:preorder(root);
                 break;
  case 4:postorder(root);
                 break;
  case 5:inorder(root);
                 break;
  case 6:printf("enter the item\n");
                 scanf("%d",&item);
                 root=delete(root,item);
                 break;
  default:exit(0);
                  break;
        }}}
```



```
1.insert        2.display       3.preorder      4.postorder     5.inorder       6.exit
enter the choice
1
enter the item
50

1.insert        2.display       3.preorder      4.postorder     5.inorder       6.exit
enter the choice
1
enter the item
23

1.insert        2.display       3.preorder      4.postorder     5.inorder       6.exit
enter the choice
1
enter the item
45

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

1.insert        2.display       3.preorder      4.postorder     5.inorder       6.exit
enter the choice
1
enter the item
89

1.insert        2.display       3.preorder      4.postorder     5.inorder       6.exit
enter the choice
1
enter the item
13

1.insert        2.display       3.preorder      4.postorder     5.inorder       6.exit
enter the choice
1
enter the item
177
```



```
1.insert        2.display       3.preorder      4.postorder     5.inorder       6.exit
enter the choice
2
    177
  89
50
    45
  23
      13
    6

1.insert        2.display       3.preorder      4.postorder     5.inorder       6.exit
enter the choice
3
50 23 6 13 45 89 177
1.insert        2.display       3.preorder      4.postorder     5.inorder       6.exit
enter the choice
4
13 6 45 23 177 89 50
1.insert        2.display       3.preorder      4.postorder     5.inorder       6.exit
enter the choice
5
6 13 23 45 50 89 177
1.insert        2.display       3.preorder      4.postorder     5.inorder       6.exit
enter the choice
9
wrong choice.THANK YOU..Press any key to continue . . .
```