```c
#include<stdio.h>
#include <stdlib.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("mem 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 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;
}
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("iten deleted at rear-end is %d",cur->info);
free(cur);
prev->link=NULL;
return first;
}
NODE insert_pos(int item,int pos,NODE first)
```

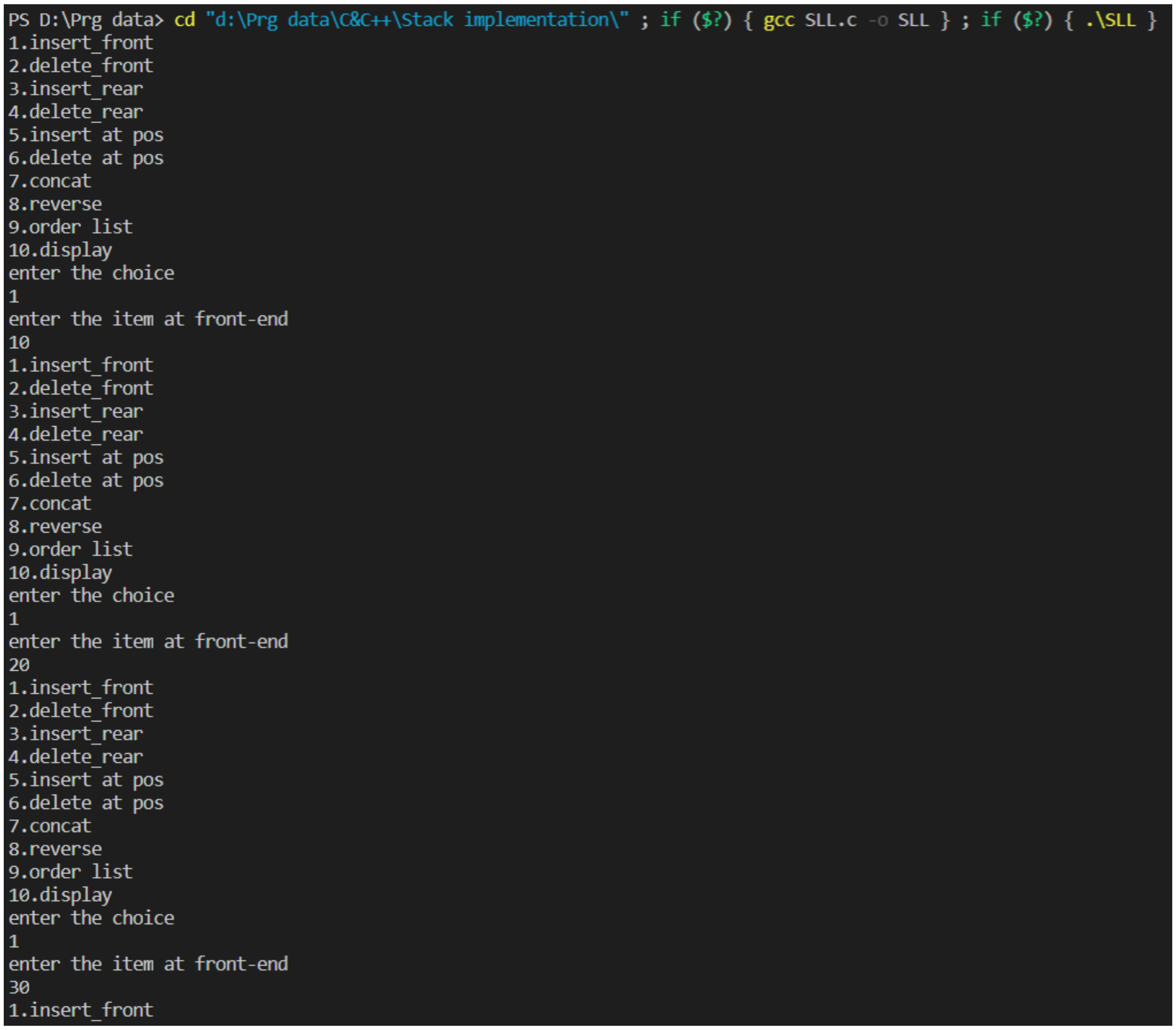
```
{
NODE temp;
NODE prev,cur;
int count;
temp=getnode();
temp->info=item;
temp->link=NULL;
if(first==NULL && pos==1)
return temp;
if(first==NULL)
{
 printf("invalid pos\n");
 return first;
}
if(pos==1)
{
temp->link=first;
return temp;
}
count=1;
prev=NULL;
cur=first;
while(cur!=NULL && count!=pos)
{
 prev=cur;
 cur=cur->link;
 count++;
}
if(count==pos)
{
prev->link=temp;
temp->link=cur;
return first;
}
printf("IP\n");
return first;
}
NODE delete_pos(int pos, NODE first){
    if (first == NULL){
      printf("List empty\n");
      return first;
    }

   NODE temp= first;
```

```c
    if (pos==1)
    {
        first = temp->link;
        free(temp);
        return first;
    }
    NODE prev;

    for (int i=1; temp!=NULL && i<pos; i++){
        prev=temp;
        temp = temp->link;
    }

    if (temp == NULL || temp->link == NULL){
            printf("Invalid position\n");
            return NULL;
    }
    prev->link=temp->link;
    printf("Element deleted %d\n",temp->info);
    free(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);
  }
}

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;
```

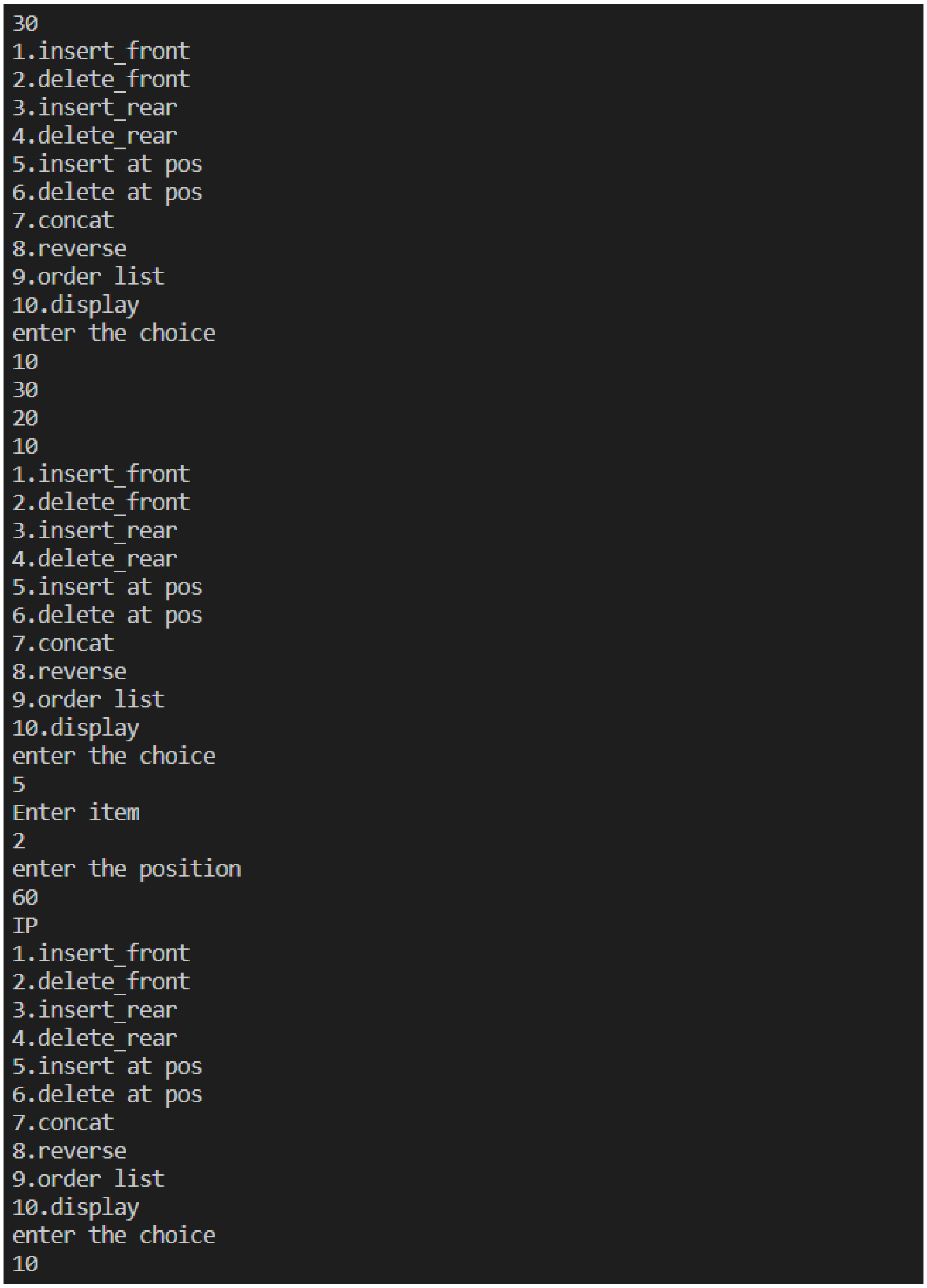
```
}


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 order_list(NODE first)
{
    int swapped, i;
    NODE ptr1,lptr=NULL;

      if (first == NULL)
      return first;

    do
    {
        swapped = 0;
        ptr1 = first;

        while (ptr1->link != lptr)
        {
            if (ptr1->info > ptr1->link->info)
            {
              int temp = ptr1->info;
              ptr1->info = ptr1->link->info;
              ptr1->link->info = temp;
              swapped = 1;
            }
            ptr1 = ptr1->link;
        }
        lptr = ptr1;
    }
    while (swapped);
    return first;
```

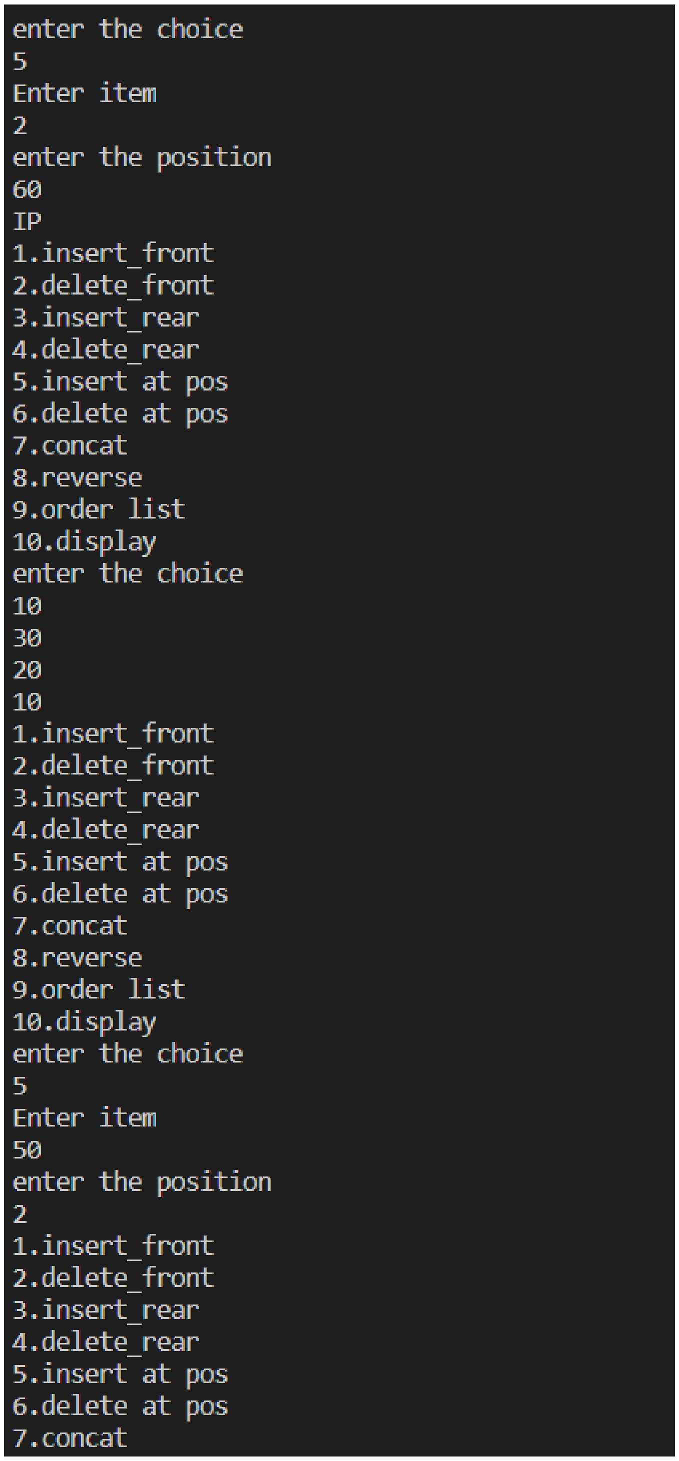
```
}
void main()
{
int item,choice,pos,i,n;
NODE a,b;
NODE first=NULL;

for(;;)
{
printf("1.insert_front\n2.delete_front\n3.insert_rear\n4.delete_rear\n5.insert at
 pos\n6.delete at pos\n7.concat\n8.reverse\n9.order list\n10.display\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:printf("enter the item at rear-end\n");
   scanf("%d",&item);
   first=insert_rear(first,item);
   break;
  case 4:first=delete_rear(first);
   break;
  case 5:
  printf("Enter item\n");
  scanf("%d",&item);
  printf("enter the position\n");
     scanf("%d",&pos);
     first=insert_pos(item,pos,first);
     break;
  case 6:
  printf("Enter posititon of deletion\n");
  scanf("%d",&pos);
  first=delete_pos(pos,first);
  break;
  case 7:
  printf("enter the no of nodes in 1\n");
     scanf("%d",&n);
     a=NULL;
     for(i=0;i<n;i++)
      {
       printf("enter the item\n");
       scanf("%d",&item);
       a=insert_rear(a,item);
      }
      printf("enter the no of nodes in 2\n");
     scanf("%d",&n);
     b=NULL;
     for(i=0;i<n;i++)
      {
       printf("enter the item\n");
       scanf("%d",&item);
       b=insert_rear(b,item);
      }
      a=concat(a,b);
      display(a);
     break;
  case 8:
  first=reverse(first);
     display(first);
     break;
  case 9:
  first=order_list(first);
  break;
  case 10:display(first);
   break;
 default:exit(0);
   break;
 }
}
}
```

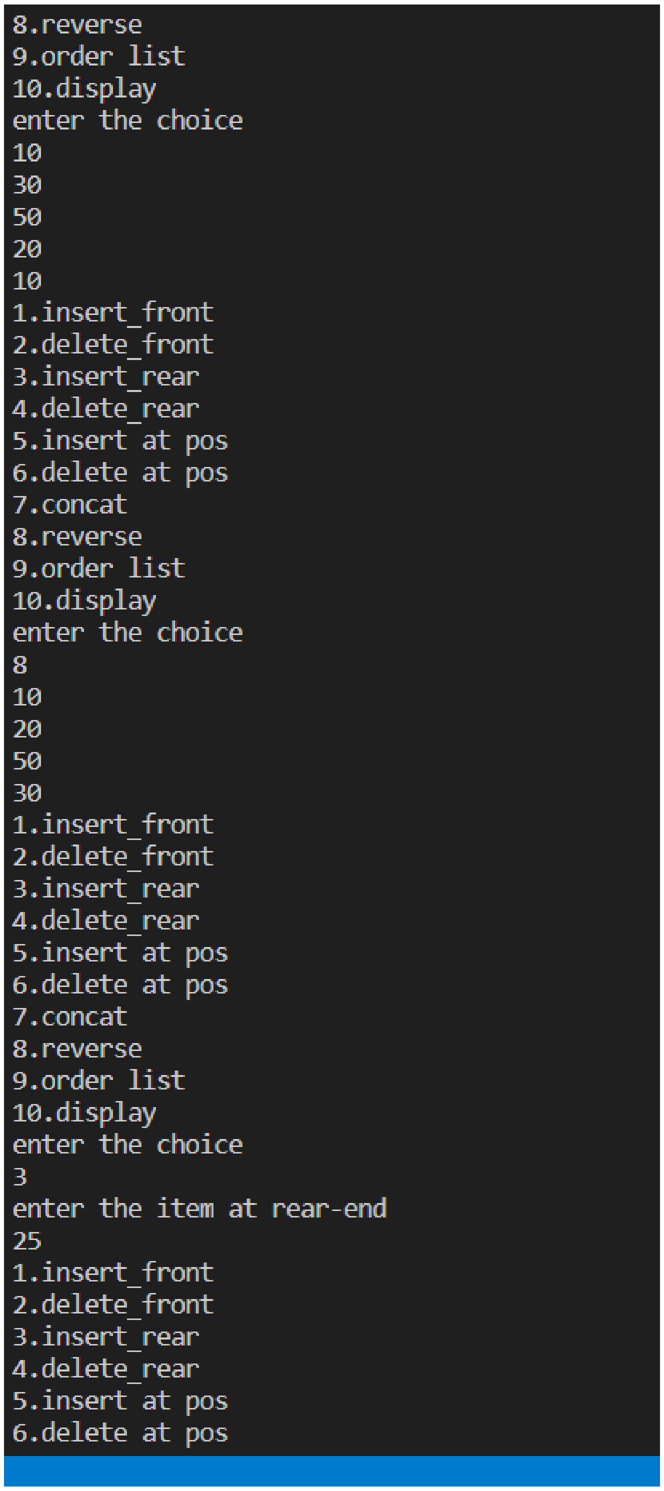
OUTPUT:

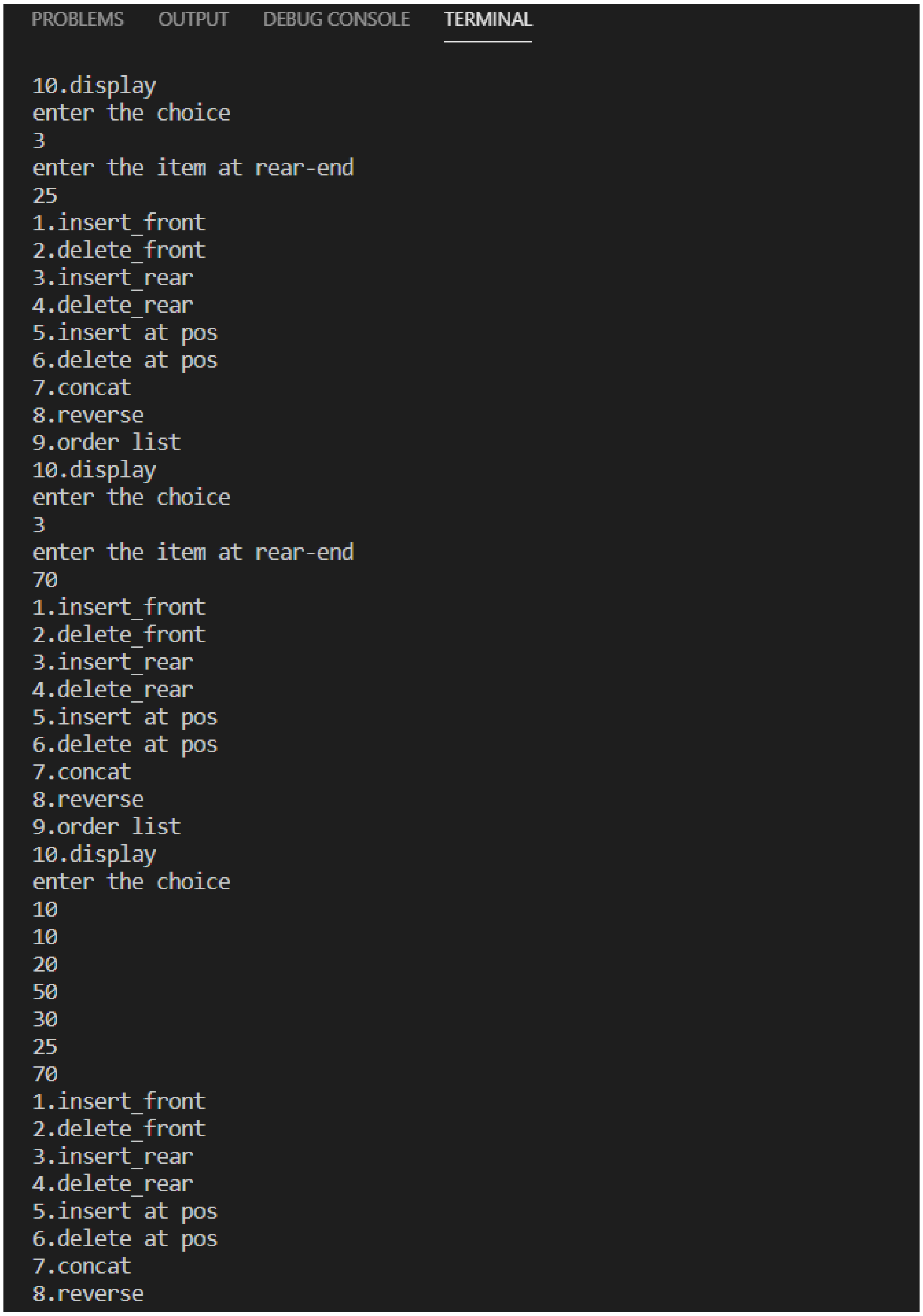


```
PS D:\Prg data> cd "d:\Prg data\C&C++\Stack implementation\" ; if ($?) { gcc SLL.c -o SLL } ; if ($?) { .\SLL }
1.insert_front
2.delete_front
3.insert_rear
4.delete_rear
5.insert at pos
6.delete at pos
7.concat
8.reverse
9.order list
10.display
enter the choice
1
enter the item at front-end
10
1.insert_front
2.delete_front
3.insert_rear
4.delete_rear
5.insert at pos
6.delete at pos
7.concat
8.reverse
9.order list
10.display
enter the choice
1
enter the item at front-end
20
1.insert_front
2.delete_front
3.insert_rear
4.delete_rear
5.insert at pos
6.delete at pos
7.concat
8.reverse
9.order list
10.display
enter the choice
1
enter the item at front-end
30
1.insert_front
```

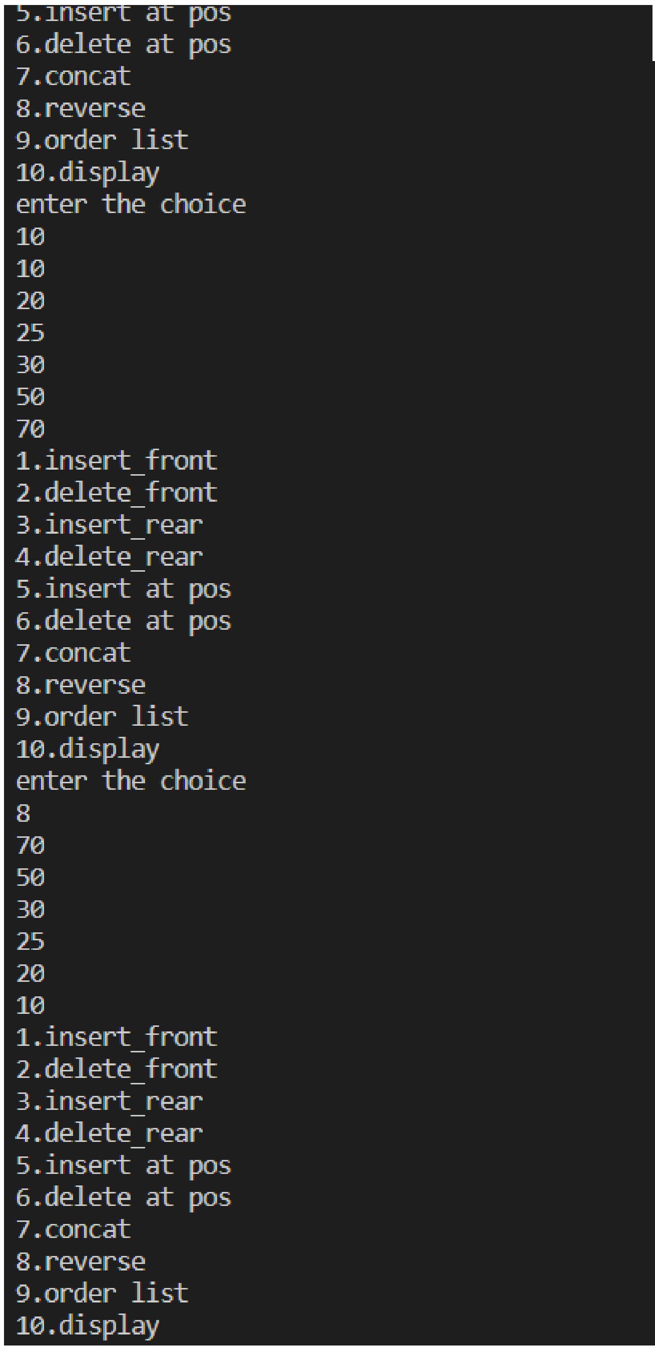

```
30
1.insert_front
2.delete_front
3.insert_rear
4.delete_rear
5.insert at pos
6.delete at pos
7.concat
8.reverse
9.order list
10.display
enter the choice
10
30
20
10
1.insert_front
2.delete_front
3.insert_rear
4.delete_rear
5.insert at pos
6.delete at pos
7.concat
8.reverse
9.order list
10.display
enter the choice
5
Enter item
2
enter the position
60
IP
1.insert_front
2.delete_front
3.insert_rear
4.delete_rear
5.insert at pos
6.delete at pos
7.concat
8.reverse
9.order list
10.display
enter the choice
10
```


```
enter the choice
5
Enter item
2
enter the position
60
IP
1.insert_front
2.delete_front
3.insert_rear
4.delete_rear
5.insert at pos
6.delete at pos
7.concat
8.reverse
9.order list
10.display
enter the choice
10
30
20
10
1.insert_front
2.delete_front
3.insert_rear
4.delete_rear
5.insert at pos
6.delete at pos
7.concat
8.reverse
9.order list
10.display
enter the choice
5
Enter item
50
enter the position
2
1.insert_front
2.delete_front
3.insert_rear
4.delete_rear
5.insert at pos
6.delete at pos
7.concat
```

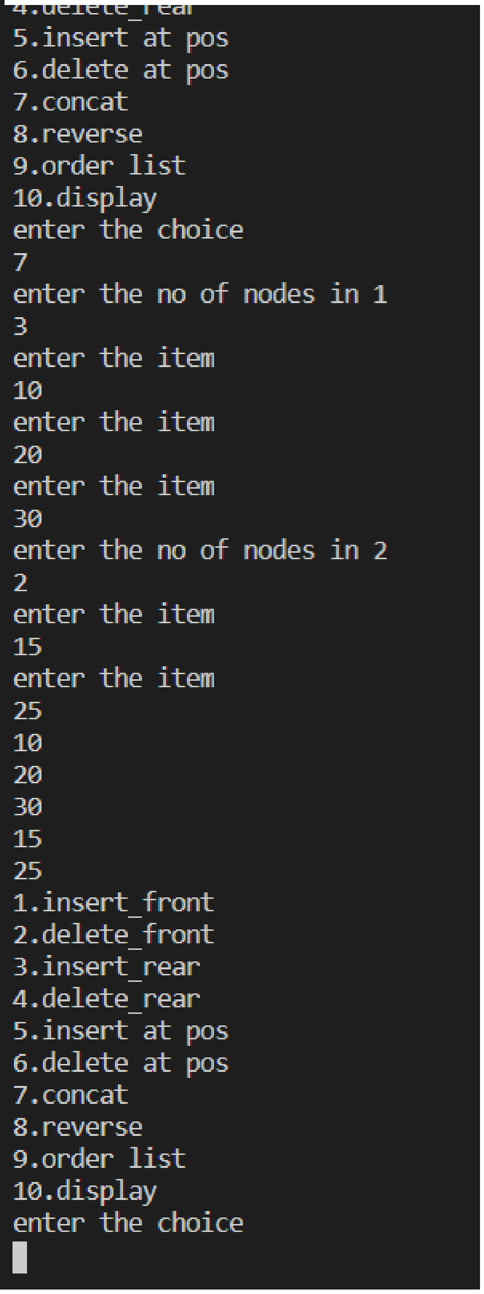

```
8.reverse
9.order list
10.display
enter the choice
10
30
50
20
10
1.insert_front
2.delete_front
3.insert_rear
4.delete_rear
5.insert at pos
6.delete at pos
7.concat
8.reverse
9.order list
10.display
enter the choice
8
10
20
50
30
1.insert_front
2.delete_front
3.insert_rear
4.delete_rear
5.insert at pos
6.delete at pos
7.concat
8.reverse
9.order list
10.display
enter the choice
3
enter the item at rear-end
25
1.insert_front
2.delete_front
3.insert_rear
4.delete_rear
5.insert at pos
6.delete at pos
```


PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL

```
10.display
enter the choice
3
enter the item at rear-end
25
1.insert_front
2.delete_front
3.insert_rear
4.delete_rear
5.insert at pos
6.delete at pos
7.concat
8.reverse
9.order list
10.display
enter the choice
3
enter the item at rear-end
70
1.insert_front
2.delete_front
3.insert_rear
4.delete_rear
5.insert at pos
6.delete at pos
7.concat
8.reverse
9.order list
10.display
enter the choice
10
10
20
50
30
25
70
1.insert_front
2.delete_front
3.insert_rear
4.delete_rear
5.insert at pos
6.delete at pos
7.concat
8.reverse
```



```
5.insert at pos
6.delete at pos
7.concat
8.reverse
9.order list
10.display
enter the choice
10
10
20
25
30
50
70
1.insert_front
2.delete_front
3.insert_rear
4.delete_rear
5.insert at pos
6.delete at pos
7.concat
8.reverse
9.order list
10.display
enter the choice
8
70
50
30
25
20
10
1.insert_front
2.delete_front
3.insert_rear
4.delete_rear
5.insert at pos
6.delete at pos
7.concat
8.reverse
9.order list
10.display
```



```
4.delete_rear
5.insert at pos
6.delete at pos
7.concat
8.reverse
9.order list
10.display
enter the choice
7
enter the no of nodes in 1
3
enter the item
10
enter the item
20
enter the item
30
enter the no of nodes in 2
2
enter the item
15
enter the item
25
10
20
30
15
25
1.insert_front
2.delete_front
3.insert_rear
4.delete_rear
5.insert at pos
6.delete at pos
7.concat
8.reverse
9.order list
10.display
enter the choice
```