Date 28/9/2020

Expt. No: Sneha Srivastava (1BM19CS158) Page No. 1

LAB PROGRAM-1 :-

Write a program to simulate the working of stack using an array with the following :-
a) Push b) Pop c) Display
The program should print appropriate message for stack overflow, stack underflow.

```
#include <stdio.h>
#include <stdlib.h>
#define MAX 10
int top = -1, stack [MAX];
void push();
void pop();
void display();

int main()
{
  int ch;
  while (1)
  {
   printf ("\n\n*** STACK MENU ***");
   printf ("\n\n1. PUSH\n2. POP\n3. DISPLAY\n4. EXIT");
   printf ("\n\n ENTER YOUR CHOICE (1-4) :");
   scanf ("%d", &ch);
```

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```
switch (ch)
{
case 1 : push();
    break;
case 2 : pop();
  break;
case 3 : display();
  break;
 case 4 : exit(0);
default : printf ("\n Wrong choice");
}
}
return 0;
}
void push()
{
  int val;
if (top == MAX-1)
{
printf ("\n STACK IS FULL");
}
else
{
printf("\n ENTER ELEMENTS TO PUSH:");
scanf ("%d, &val);
 top= top+1;
  stack [top] = val ;
 }
}
```

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```
void pop()
{
if (top==-1)
{
 printf ("\n STACK IS EMPTY");
}
else
{
printf("\n DELETED ELEMENT IS %d", stack[top]);
top = top-1;
}
}
void display()
{
 int i;
if (top==-1)
 {
  printf ("\n STACK IS EMPTY"),
 }
 else
{
 printf ("\n STACK IS...");
for (i=top; i>=0; --i)
printf("%d\n", stack[i]);
 }
}
```

Teacher's Signature : _____

OUTPUT SCREENSHOTS:

```
Snehas-MacBook-Pro:ccp snehasrivastava$ gcc stack.c
Snehas-MacBook-Pro:ccp snehasrivastava$ ./a.out

***STACK MENU***

1.PUSH
2.POP
3.DISPLAY
4.EXIT

ENTER YOUR CHOICE(1-4):2

STACK IS EMPTY
***STACK MENU***

1.PUSH
2.POP
3.DISPLAY
4.EXIT

ENTER YOUR CHOICE(1-4):1
```

```
ENTER YOUR CHOICE(1-4):1

 ENTER ELEMENTS TO PUSH:5

***STACK MENU***

1.PUSH
2.POP
3.DISPLAY
4.EXIT

ENTER YOUR CHOICE(1-4):1

 ENTER ELEMENTS TO PUSH:67

***STACK MENU***

1.PUSH
2.POP
3.DISPLAY
4.EXIT

ENTER YOUR CHOICE(1-4):3

 STACK IS...67
5
```

```
***STACK MENU***

1.PUSH
2.POP
3.DISPLAY
4.EXIT

ENTER YOUR CHOICE(1-4):1

 ENTER ELEMENTS TO PUSH:67

***STACK MENU***

1.PUSH
2.POP
3.DISPLAY
4.EXIT

ENTER YOUR CHOICE(1-4):3

 STACK IS...67
5

***STACK MENU***

1.PUSH
2.POP
3.DISPLAY
4.EXIT
```

```
ENTER YOUR CHOICE(1-4):2

DELETED ELEMENT IS 67
***STACK MENU***

1.PUSH
2.POP
3.DISPLAY
4.EXIT

ENTER YOUR CHOICE(1-4):3

 STACK IS...5

***STACK MENU***

1.PUSH
2.POP
3.DISPLAY
4.EXIT

ENTER YOUR CHOICE(1-4):4
Snehas-MacBook-Pro:ccp snehasrivastava$
```

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LAB PROGRAM-2:-

WAP to convert a given valid parenthesized infix arithematic expression to postfix expression. The expression consists of single character operands and the binary operators + (plus), - (minus), * (multiply) and / (divide).

```
#include <stdio.h>
#include <string.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)
 {
```

Teacher's Signature :

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

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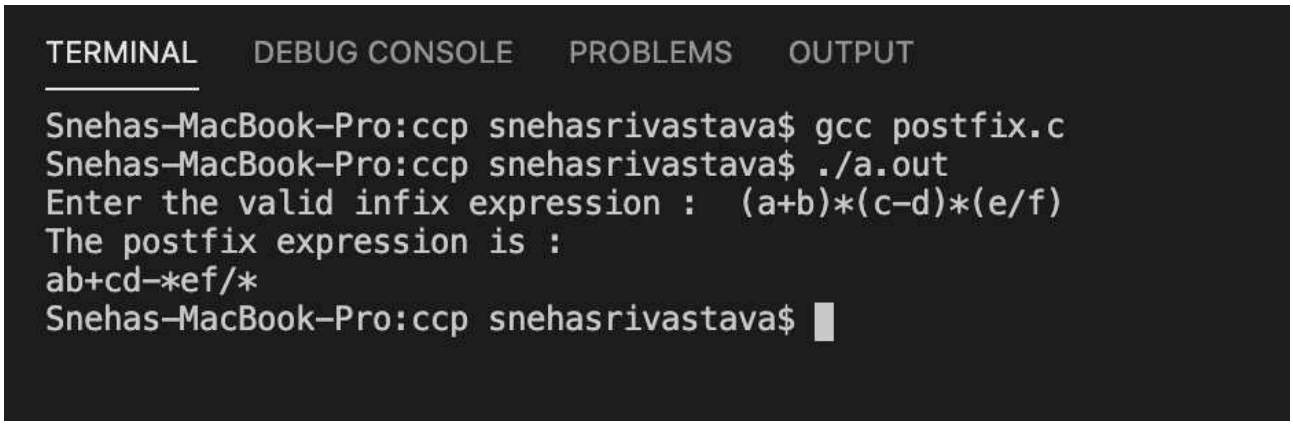
```
if (F(s[top]) != G(symbol))
  s[++top] = symbol;
  else
  top--;
}
While (s[top] != '#')
{
  postfix[j++] = s[top--];
  postfix[j] = '\0';
  }
}
int main()
{
char infix[20];
char postfix[20];
printf("Enter the valid infix expression :");
scanf("%s", infix);
infix_postfix(infix, postfix);
printf("The postfix expression is :\n");
printf("%s\n", postfix);
return 0;
}
```

Teacher's Signature :

OUTPUT SCREENSHOTS:



Date 19/10/2020

Expt. No. ---------- Page No. 16

LINEAR QUEUE

```
#include<stdio.h>
#include<stdlib.h>
#define qsize 5
int item, front=0, rear=-1, q[10];
void insertrear()
{
  if(rear==qsize-1)
  {
   printf("Queue overflow\n");
   return;
  }
  rear=rear+1;
  q[rear]=item;
}
int deletefront()
 {
   if(front>rear)
   {
     front=0;
     rear=-1;
     return-1;
   }
   return q[front++];
 }
void displayQ()
```

Teacher's Signature : _____

Date

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```
{
  int i;
  if (front > rear)
  {
    printf("Queue is empty\n");
    return;
  }
  printf("Contents of queue\n");
  for (i = front; i <= rear; i++)
  {
    printf("%d\n", q[i]);
  }
}
int main()
{
  int ch;
  for (;;)
  {
    printf("\n1. insert_rear\n2. delete_front\n3. display\n4. exit\n");
    printf("enter choice\n");
    scanf("%d", &ch);
    switch(ch)
    {
      case 1: printf("enter the item to be inserted\n");
              scanf("%d", &item);
              insert_rear();
              break;
```

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```
case 2 : item = deletefront();
         if (item == -1)
         printf("Item Queue is empty\n");
         else
         printf("Item deleted = %d\n", item);
         break;
case 3:  displayQ();
         break;
default : exit(0);
   }
 }
return 0;
}
```

Teacher's Signature :

OUTPUT SCREENSHOTS:

```
TERMINAL  DEBUG CONSOLE  PROBLEMS 2  OUTPUT
Snehas-MacBook-Pro:ccp snehasrivastava$ gcc linearq.c
Snehas-MacBook-Pro:ccp snehasrivastava$ ./a.out

1.insert_rear
2.delete_front
3.display
4.exit
enter choice
2
Queue is empty

1.insert_rear
2.delete_front
3.display
4.exit
enter choice
1
enter the item to be inserted
12

1.insert_rear
2.delete_front
3.display
4.exit
enter choice
1
enter the item to be inserted
56

1.insert_rear
2.delete_front
3.display
4.exit
enter choice
2
Item deleted=12

1.insert_rear
2.delete_front
3.display
4.exit
enter choice
2
Item deleted=56

1.insert_rear
2.delete_front
3.display
4.exit
enter choice
3
Queue is empty

1.insert_rear
2.delete_front
3.display
4.exit
enter choice
4
Snehas-MacBook-Pro:ccp snehasrivastava$
```

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Expt. No. ---------- Page No. 13

CIRCULAR QUEUE

```
#include <stdio.h>
#include <stdlib.h>
#define qsize 5
int item, f=0, r=-1, q[qsize], count=0, ch;
void insertreax()
{
 if (count==qsize)
 {
  printf("Queue overflow\n");
  return;
 }
 r=(r+1)%qsize;
  q[r] = item;
  count++;
}
int deletefront()
{
 if (count==0) return -1;
 item=q[f];
  f=(f+1)%qsize;
  count = count-1;
  return item;
}
void displayQ()
{
```

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Expt. No. Page No. 14

```
int i, front;
if (count == 0)
{
printf("Queue is empty\n");
return;
}
front = f;
printf("Contents of queue\n");
for (i = 1; i <= count; i++)
{
printf("%d\n", q[front]);
front = (front+1) % qsize;
}
}
int main()
{
for (;;)
{
printf("\n1.insert_rear\n2.delete_front\n3.display\n4.exit\n");
printf("Enter choice\n");
scanf("%d", &ch);
switch(ch)
{
case 1: printf("enter the item to be inserted\n");
        scanf("%d", &item);
        insertrear();
        break;
```

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Expt. No. Page No. 15

```
case 2 : item=deletefront();
         if (item == -1)
         printf ("Queue is empty \n");
         else
         printf (" Item deleted = %d \n", item);
         break;
case 3 : displayQ();
         break;
default : exit (0);
 }
}
return 0;
}
```

Teacher's Signature :

OUTPUT SCREENSHOTS:

```
TERMINAL  DEBUG CONSOLE  PROBLEMS  OUTPUT
Snehas-MacBook-Pro:ccp snehasrivastava$ gcc circularq.c
Snehas-MacBook-Pro:ccp snehasrivastava$ ./a.out

1.insert_rear
2.delete_front
3.display
4.exit
enter choice
2
Queue is empty

1.insert_rear
2.delete_front
3.display
4.exit
enter choice
1
enter the item to be inserted
47

1.insert_rear
2.delete_front
3.display
4.exit
enter choice
1
enter the item to be inserted
93

1.insert_rear
2.delete_front
3.display
4.exit
enter choice
2
Item deleted=47

1.insert_rear
2.delete_front
3.display
4.exit
enter choice
2
Item deleted=93

1.insert_rear
2.delete_front
3.display
4.exit
enter choice
3
Queue is empty

1.insert_rear
2.delete_front
3.display
4.exit
enter choice
4
Snehas-MacBook-Pro:ccp snehasrivastava$
```

LAB PROGRAM :- SINGLY LINKED LIST

```
#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 IF(NODE second, int item)
{
 NODE temp;
 temp= getnode();
 temp -> info = item;
 temp-> link = NULL;
 if (second == NULL)
 return temp;
 temp-> link = second;
 second = temp;
 return second;
}

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 IR (NODE second, int item)
{
  NODE temp, cur ;
  temp = getnode();
  temp->info = item;
  temp -> link = NULL;
  if ( second == NULL)
  return temp;
  cur = second;
While ( cur -> Link != NULL)
cur = cur -> Link ;
cur -> link = temp;
return second ;
}
```

```
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", 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 ("Invalid Position\n");
return first;
}
```

```
NODE delete_pos(int pos, NODE first)
{
 NODE cur;
 NODE prev;
 int count;
 if (first==NULL || pos<=0)
{
 printf("invalid position\n");
 return NULL;
 }
 if (pos == 1)
{
 cur = first;
  first = first->link;
  freenode(cur);
  return first;
}
 prev = NULL;
 cur = first;
 count = 1;
 while (cur != NULL)
 {
 if (count == pos)
   break; // if found
  prev = cur;
  cur = cur -> link;
  count++;
 }
 if (count != pos)
{
 printf("Invalid position\n");
 return first;
}
```

```
if (count!=pos)
{
printf ("invalid position specified \n");
return first;
}
prev->link = cur->link;
freenode (cur);
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 asc (NODE first)
{
 NODE prev = first;
 NODE cur = NULL;
        int temp;
 if (first == NULL)
 {
    return 0;
 }
```

```
else
{
while ( prev != NULL)
{
cur = prev->link ;
while ( cur != NULL)
{
if (prev -> info > cur -> info)
{
temp = prev->info;
prev-> info = cur->info;
cur-> info = temp;
}
cur = cur->link ;
}
prev = prev -> link;
}
return first;
}

NODE des (NODE first)
{
NODE prev = first;
NODE cur = NULL;
int temp;
if ( first == NULL)
{
return 0;
}
else
{
```

```
while( prev!=NULL)
{
cur = prev->link;
while ( cur!=NULL)
{
if (prev->info < cur->info)
{
  temp = prev->info;
  prev->info = cur->info;
  cur->info = temp;
}
  cur = cur->link;
}
prev = prev->link;
  }
  }
return first;
}
NODE concate ( 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);
 }
}

int main()
{
int item, choice, pos, element, option, choice2, item1, num;
 NODE first = NULL;
 NODE second= NULL;
  for (;;)
 {
printf("\n1. Insert_front\n2 :Delete_front\n3 : Insert_rear \n 4: Delete_rear
\n5. random-position \n 6: reverse \n 7: sort \n 8: concate\n
 9. display_list \n 10. 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 : 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("press 1 to insert or 2 to delete at any desired position\n");
scanf("%d",&element);
if(element==1)
{
printf("enter the position to insert\n");
scanf("%d",&pos);
printf("enter the item to insert\n");
scanf("%d",&item);
first=insert_pos(item,pos,first);
}
if(element==2)
{
printf("enter the position to delete\n");
scanf("%d",&pos);
first=delete_pos(pos,first);
}
break;
case 6:
    first=reverse(first);
    break;
case 7:
    printf("press 1 for ascending sort and 2 for descending sort:\n");
    scanf("%d",&option);
    if(option==1)
    first=asc(first);
    if(option==2)
```

```
first = des (first);
break;
case 8 :
printf ("create a second list \n");
printf (" enter the number of elements in second list \n");
scanf ("%d, &num);
for (int i=1; i<=num; i++)
{
printf ("\n press 1 to insert front and 2 to insert rear \n");
scanf ("%d", &choice2);
if (choice2==1)
{
printf ("enter the item at front end \n");
scanf ("%d", &item1);
second = IF (second, item1);
}
if (choice 2==2)
{
printf (" enter the item at rear end \n");
scanf ("%d", &item1);
second = IR (second, item1);
}
}
first = concate (first, second);
break;
case 9 : display (first);
         break;
default: exit (0);
         break;
}
}
return 0;
}
```

OUTPUT SCREENSHOTS:

```
TERMINAL  DEBUG CONSOLE  PROBLEMS  OUTPUT

 1:Insert_front
 2:Delete_front
 3:Insert_rear
 4:Delete_rear
 5:random_position
 6:reverse
 7:sort
 8.concate
 9:display_list
 10:Exit
enter the choice
1
enter the item at front-end
4

 1:Insert_front
 2:Delete_front
 3:Insert_rear
 4:Delete_rear
 5:random_position
 6:reverse
 7:sort
 8.concate
 9:display_list
 10:Exit
enter the choice
3
enter the item at rear-end
7

 1:Insert_front
 2:Delete_front
 3:Insert_rear
 4:Delete_rear
 5:random_position
 6:reverse
 7:sort
 8.concate
 9:display_list
 10:Exit
enter the choice
5
press 1 to insert or 2 to delete at any desired position
1
enter the position to insert
2
enter the item to insert
34

 1:Insert_front
 2:Delete_front
 3:Insert_rear
 4:Delete_rear
 5:random_position
 6:reverse
 7:sort
 8.concate
 9:display_list
 10:Exit
```

```
TERMINAL   DEBUG CONSOLE   PROBLEMS   OUTPUT
 10:Exit
enter the choice
7
press 1 for ascending sort and 2 for descending sort:
1

 1:Insert_front
 2:Delete_front
 3:Insert_rear
 4:Delete_rear
 5:random_position
 6:reverse
 7:sort
 8.concate
 9:display_list
 10:Exit
enter the choice
8
create a second list
enter the number of elements in second list
2

 press 1 to insert front and 2 to insert rear
1
enter the item at front-end
56

 press 1 to insert front and 2 to insert rear
2
enter the item at rear-end
56

 1:Insert_front
 2:Delete_front
 3:Insert_rear
 4:Delete_rear
 5:random_position
 6:reverse
 7:sort
 8.concate
 9:display_list
 10:Exit
enter the choice
9
4
7
34
56
56

 1:Insert_front
 2:Delete_front
 3:Insert_rear
 4:Delete_rear
 5:random_position
 6:reverse
 7:sort
 8.concate
 9:display_list
 10:Exit
```

LAB PROGRAM

```
# 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_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", cur->info);
   free (cur);
   prev->link = NULL;
    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);
}
}

int length (NODE first)
{
   NODE cur;
   int count =0;
   if (first == NULL)
   return 0;
   cur =first;
   while (cur != NULL)
   {
    count ++;
    cur = cur->link;
   }
   return count;
}

void search ( int key, NODE first)
{
  NODE cur;
  if (first==NULL)
  {
  printf ("List is empty\n");
```

```
return;
}
cur = first;
while (cur!=NULL)
{
  if (key == cur->info)
    break;
    cur = cur -> link;
}
  if (cur == NULL)
{
  printf ("Search is unsuccessful\n");
    return;
}
  printf (" Search successful\n");
}

NODE asc (node first)
{
  NODE prev= first;
  NODE cur = NULL;
    int temp;
if (first == NULL)
{
    return 0;
}
else
{
  while (prev!=NULL)
  {
  cur = prev->link;
  while (cur!=NULL) {
```

```
if (prev->info > cur->info) {
  temp = prev->info;
  prev->info = cur->info;
   cur->info = temp;
  }
  cur = cur->link;
  prev = prev->link;
   }
  }
  return first;
 }

 NODE des (NODE first)
{
  NODE prev = first;
  NODE cur = NULL;
    int temp;
  if (first == NULL)
  {
    return 0;
  }
  else
{
  while (prev != NULL)
  {
  cur = prev->link;
  while (cur != NULL)
  {
  if (prev->info < cur->info)
{
  temp = prev->info;
  prev->info = cur->info;
```

```
cur->info = temp;
}
cur = cur -> link;
}
prev = prev->link;
}
}
return first;
}

int main()
{
int item, choice, count, key, option;
NODE first = NULL;
for (;;)
{
printf("\n1: Insert_front\n 2: Delete_rear\n 3: Display_list\n 4:
Count items\n 5: Search items\n 6: Order_list\n 7: 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_rear (first);
break;
case 3:
display (first);
```

```
break;
case 4:
count = length(first);
printf("Length of items in the list is %d\n", count);
break;
case 5:
printf("enter the item to be searched\n");
scanf("%d", &key);
search(key, first);
break;
case 6:
printf("\n1. ascending ordered-list\n2. descending ordered-list\n");
scanf("%d", &option);
if (option == 1)
{
  first = asc(first);
  display(first);
}
else
{
  first = des(first);
  display(first);
}
break;
default:
exit(0);
}
}
return 0;
}
```

OUTPUT SCREENSHOTS:

```
TERMINAL  DEBUG CONSOLE  PROBLEMS  OUTPUT
Snehas-MacBook-Pro:ccp snehasrivastava$ gcc ll.c
Snehas-MacBook-Pro:ccp snehasrivastava$ ./a.out

 1:Insert_front
 2:Delete_rear
 3:Display_list
 4:Count items
 5:Search items
 6:Order_list
 7:Exit
enter the choice
1
enter the item at front-end
12

 1:Insert_front
 2:Delete_rear
 3:Display_list
 4:Count items
 5:Search items
 6:Order_list
 7:Exit
enter the choice
1
enter the item at front-end
23

 1:Insert_front
 2:Delete_rear
 3:Display_list
 4:Count items
 5:Search items
 6:Order_list
 7:Exit
enter the choice
1
enter the item at front-end
56

 1:Insert_front
 2:Delete_rear
 3:Display_list
 4:Count items
 5:Search items
 6:Order_list
 7:Exit
enter the choice
3
56
23
12

 1:Insert_front
 2:Delete_rear
 3:Display_list
 4:Count items
 5:Search items
 6:Order_list
 7:Exit
enter the choice
```

```
TERMINAL  DEBUG CONSOLE  PROBLEMS  OUTPUT
 7:Exit
enter the choice
2
iten deleted at rear-end is 12
 1:Insert_front
 2:Delete_rear
 3:Display_list
 4:Count items
 5:Search items
 6:Order_list
 7:Exit
enter the choice
4
Length of items in the list is 2

 1:Insert_front
 2:Delete_rear
 3:Display_list
 4:Count items
 5:Search items
 6:Order_list
 7:Exit
enter the choice
5
enter the item to be searched
12
Search is unsuccessful

 1:Insert_front
 2:Delete_rear
 3:Display_list
 4:Count items
 5:Search items
 6:Order_list
 7:Exit
enter the choice
6

1:ascending ordered_list
2:descending ordered_list
1
23
56

 1:Insert_front
 2:Delete_rear
 3:Display_list
 4:Count items
 5:Search items
 6:Order_list
 7:Exit
enter the choice
6

1:ascending ordered_list
2:descending ordered_list
2
56
23
```

```
 1:Insert_front
 2:Delete_rear
 3:Display_list
 4:Count items
 5:Search items
 6:Order_list
 7:Exit
enter the choice
7
Snehas-MacBook-Pro:ccp snehasrivastava$
```

1BM19CS158

```
#include <stdio.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("Memory 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_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 ("Doubly linked list empty\n");
  return head;
}
cur = head->rlink;
next = cur->rlink;
head->rlink = next;
next->llink = head;
printf ("In the node deleted is %d", cur->info);
freenode (cur);
```

```
return head;
}
NODE ddelete_rear(NODE head)
{
 NODE cur, prev;
 if (head->rlink == head)
 {
  printf("Doubly linked list empty\n");
   return head;
 }
 cur=head->llink;
 prev = cur->llink;
 head->llink = prev;
 prev->rlink = head;
 printf("\n The node deleted is %d.", cur->info);
 freenode(cur);
 return head;
}

void display (NODE head)
{
  NODE temp;
 if (head->rlink == head)
 {
   printf("Doubly linked list empty\n");
   return;
 }
 printf("Contents of the doubly linked list\n");
 temp= head->rlink;
 while (temp!=head)
 {
  printf("%d\t", temp->info);
```

```
    temp = temp->rlink;
}
printf("\n");

NODE delete_all_key(int item, NODE head)
{
    NODE prev, cur, next;
    int count;
    if (head->rlink == head)
    {
        printf("Doubly Linked list empty\n");
        return head;
    }
    count = 0;
    cur = head->rlink;
    while (cur != head)
    {
        if (item != cur->info)
            cur = cur->rlink;
        else
        {
            count++;
            prev = cur->llink;
            next = cur->rlink;
            prev->rlink = next;
            next->llink = prev;
            free node(cur);
            cur = next;
        }
    }
    if (count == 0)
        printf("Key not found\n");
```

```
else
printf ("Key found at %d positions and are deleted \n", count);
return head;
}

NODE insert_leftpos (int item, NODE head)
{
    NODE temp, cur, prev;
    if (head->rlink == head)
    {
        printf ("Doubly linked list empty \n");
        return head;
    }
cur = head->rlink;
while (cur != head)
{
    if (item <= cur->info) break;
        cur = cur->rlink;
    }
    if (cur==head)
    {
        printf ("Key not found \n");
        return head;
    }
prev= cur->llink;
printf ("\n Enter towards left of %d=", item);
    temp=getnode();
    scanf ("%d", &temp->info);
    prev->rlink = temp;
    temp->llink = prev;
    cur->llink = temp;
    temp->rlink = cur;
    return head;
}
```

```
NODE insert_rightpos (int item, NODE head)
{
  NODE temp, cur, prev;
  if (head->rlink == head)
  {
    printf ("Doubly linked list empty\n");
    return head;
  }
  cur = head->llink;
  while (cur != head)
  {
    if (item == cur->info) break;
    cur = cur->llink;
  }
  if (cur == head)
  {
    printf ("Key not found\n");
    return head;
  }
  prev = cur->rlink;
  printf ("\nEnter towards right of %d= ", item);
  temp = getnode();
  scanf ("%d", &temp->info);
  prev->llink = temp;
  temp->rlink = prev;
  cur->rlink = temp;
  temp->llink = cur;
  return head;
}
```

```
void search (NODE head)
{
  struct node *ptr;
  int item, i=0, flag;
  ptr = head;
  if (ptr == NULL)
  {
    printf ("Doubly linked list empty \n");
  }
  else
  {
  printf ("\nEnter item which you want to search ?\n");
  scanf ("%d", &item);
  while (ptr != NULL)
  {
    if (ptr->info == item)
    {
      printf ("\n item found at location %d", i+1);
      flag = 0;
      break;
    }
    else
    {
      flag = 1;
      printf ("\n Item not found \n");
      break;
    }
  }
 }
}
int main ()
{
```

```
NODE head, last;
int item, choice, choice1;
head = getnode();
head->rlink = head;
head->llink = head;

for(;;)
{
printf("\n1: insert front\n2: insert rear\n3: delete front\n
4: delete rear\n5: display\n6: delete all occurences\n
7: simple search\n8: do insert node before & after the
key node\n9: 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 element to be deleted\n");
        scanf("%d", &item);
```

```
delete_all_key (item, head);
 break;
 case 7: search (head);
          break;
 case 8:
 printf ("\n1. insert towards left\n 2: insert towards right \n");
 printf ("enter the choice\n");
 scanf ("%d, &choice1);
 if (choice1 ==1)
 {
  printf ("enter the key element \n");
  scanf ("%d", &item);
  last = insert_leftpos (item, head);
   break;
 }
 else
 {
  printf ("Enter the key element\n");
   scanf ("%d", &item);
   last = insert_rightpos (item, head);
   break;
 }
    default: exit (0);
    }
 }
 return 0;
}
```

OUTPUT SCREENSHOTS:

```
TERMINAL  DEBUG CONSOLE  PROBLEMS  OUTPUT
Snehas-MacBook-Pro:ccp snehasrivastava$ ./a.out

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:delete all occurences
7:simple search
8:insert node before & after the key node
9:exit
enter the choice
1
enter the item at front end
56

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:delete all occurences
7:simple search
8:insert node before & after the key node
9:exit
enter the choice
1
enter the item at front end
78

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:delete all occurences
7:simple search
8:insert node before & after the key node
9:exit
enter the choice
2
enter the item at rear end
56

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:delete all occurences
7:simple search
8:insert node before & after the key node
9:exit
enter the choice
2
enter the item at rear end
56
```

```
TERMINAL   DEBUG CONSOLE   PROBLEMS   OUTPUT
56

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:delete all occurences
7:simple search
8:insert node before & after the key node
9:exit
enter the choice
5
Contents of the doubly linked list
78      56      56      56

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:delete all occurences
7:simple search
8:insert node before & after the key node
9:exit
enter the choice
6
enter element to be deleted
5
Key not found

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
Snehas-MacBook-Pro:ccp snehasrivastava$
Snehas-MacBook-Pro:ccp snehasrivastava$ gcc dll.c
Snehas-MacBook-Pro:ccp snehasrivastava$ ./a.out

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:delete all occurences
7:simple search
8:insert node before & after the key node
9:exit
enter the choice
1
enter the item at front end
23

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:delete all occurences
```

```
TERMINAL   DEBUG CONSOLE   PROBLEMS   OUTPUT
1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:delete all occurences
7:simple search
8:insert node before & after the key node
9:exit
enter the choice
2
enter the item at rear end
56

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:delete all occurences
7:simple search
8:insert node before & after the key node
9:exit
enter the choice
2
enter the item at rear end
89

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:delete all occurences
7:simple search
8:insert node before & after the key node
9:exit
enter the choice
5
Contents of the doubly linked list
56      12      56      89

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:delete all occurences
7:simple search
8:insert node before & after the key node
9:exit
enter the choice
8

1:insert towards left
2:insert towards right
enter the choice
1
enter the key element
12
```

```
TERMINAL  DEBUG CONSOLE  PROBLEMS  OUTPUT
9:exit
enter the choice
2
enter the item at rear end
56

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:delete all occurences
7:simple search
8:insert node before & after the key node
9:exit
enter the choice
8

1:insert towards left
2:insert towards right
enter the choice
2
enter the key element
Snehas-MacBook-Pro:ccp snehasrivastava$ gcc dll.c
Snehas-MacBook-Pro:ccp snehasrivastava$ ./a.out

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:delete all occurences
7:simple search
8:insert node before & after the key node
9:exit
enter the choice
1
enter the item at front end
12

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:delete all occurences
7:simple search
8:insert node before & after the key node
9:exit
enter the choice
1
enter the item at front end
56

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:delete all occurences
```

```
TERMINAL  DEBUG CONSOLE  PROBLEMS  OUTPUT
enter the key element
12

Enter towards left of 12=56

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:delete all occurences
7:simple search
8:insert node before & after the key node
9:exit
enter the choice
5
Contents of the doubly linked list
56      56      12      56      89

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:delete all occurences
7:simple search
8:insert node before & after the key node
9:exit
enter the choice
6
enter element to be deleted
56
Key found at 3 positions and are deleted

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:delete all occurences
7:simple search
8:insert node before & after the key node
9:exit
enter the choice
5
Contents of the doubly linked list
12      89

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:delete all occurences
7:simple search
8:insert node before & after the key node
9:exit
enter the choice
9
Snehas-MacBook-Pro:ccp snehasrivastava$
```

classmate
Date 21/12/2020
Page

1BM19CS158

BINARY TREE

```
#include <stdio.h>
#include <stdlib.h>
#include <string.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 ("Memory not available!");
exit(0);
}
return x;
}
void freenode (NODE x)
{
free(x);
}
NODE insert (int item, NODE root)
{
NODE temp, cur, prev;
char direction [10];
int i;
```

```
temp=getnode();
temp->info=item;
temp->llink=NULL;
temp->rlink=NULL;
if(root==NULL)
 return temp;
printf("Give direction to insert..\n");
scanf("%s",direction);
prev=NULL;
cur=root;
for(i=0;i<strlen(direction)&&cur!=NULL;i++)
{
 prev=cur;
 if(direction[i]=='l')
  cur=cur->llink;
 else
  cur=cur->rlink;
}
if(cur!=NULL||i!=strlen(direction))
{
printf("Insertion not possible\n");
freenode(temp);
return(root);
}
if(cur==NULL)
if(direction[i-1]=='l')
 prev->llink=temp;
  else
 prev->rlink=temp;
}
  return(root);
}
```

```
void preorder (NODE root)
{
 if (root != NULL)
 {
  printf ("The item is %d\n", root->info);
  preorder (root -> llink);
  preorder ( root -> rlink);
 }
}
void inorder (NODE root)
 {
  if (root != NULL)
  {
   inorder ( root -> llink);
   printf (" The item is %d\n", root -> info);
   inorder (root -> rlink);
  }
 }
 void postorder ( NODE root)
  {
   if (root != NULL)
   {
   postorder ( root -> llink);
   postorder ( root -> rlink);
   printf (" The item is %d\n", root -> info);
   }
  }
  void display (NODE root, int i)
  {
   int j;
   if (root != NULL)
   {
```

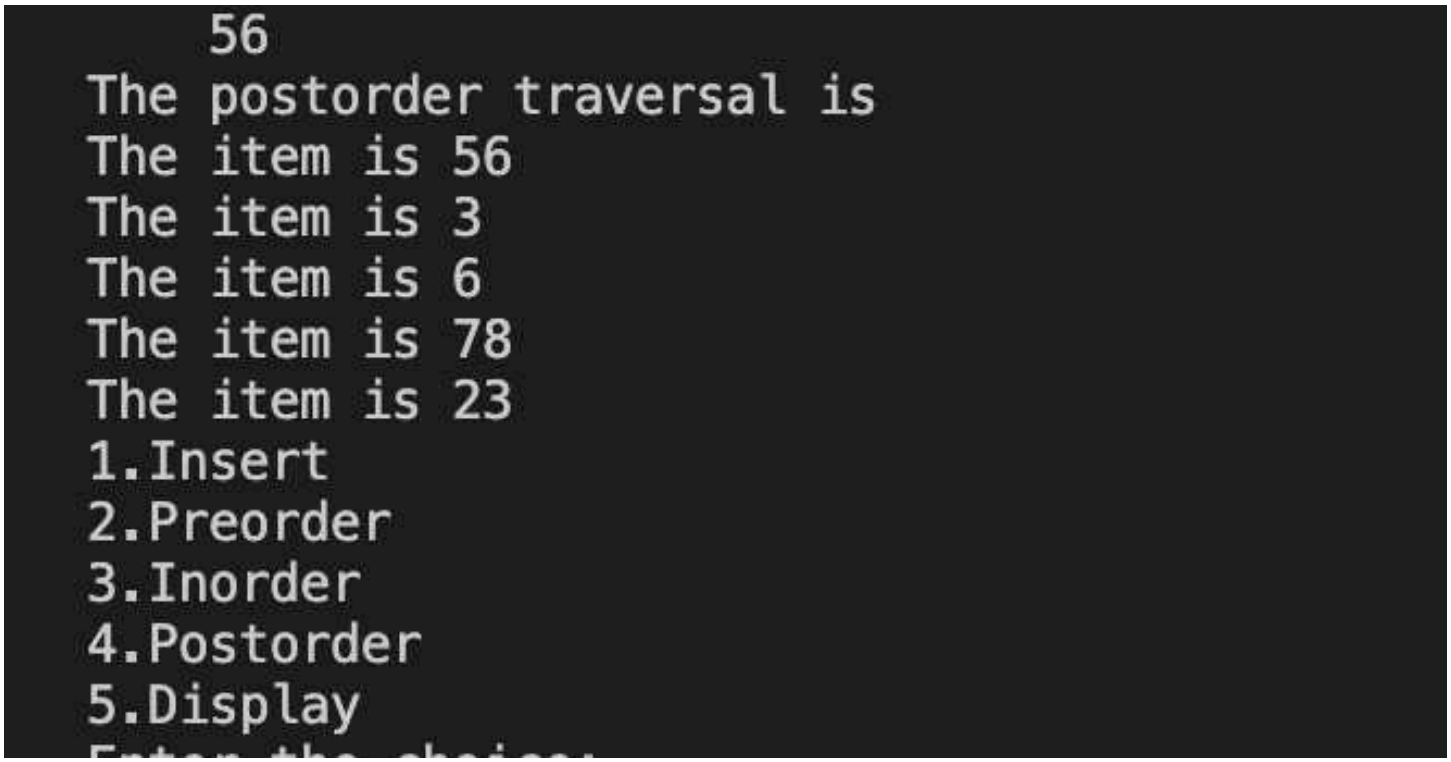
```
display (root->rlink, i+1);
for (j=1; j<=i; j++)
printf (" ");
printf ("%d\n", root->info);
display (root->llink, i+1);
}
}
int main ()
{
NODE root = NULL;
int choice, i, item;
for(;;)
{
printf ("1. Insert \n2. Preorder \n3. Inorder \n4. Postorder \n5. Display\n");
printf (" Enter the choice :\n");
scanf ("%d", &choice);
switch (choice)
{
case 1 : printf (" Enter the item: \n");
         scanf ("%d", &item);
         root= insert (item, root);
         break;
case 2 : if (root==NULL)
         {
           printf (" Tree is empty!");
         }
         else
         {
         printf (" Given tree is . . \n");
         display (root, 1);
         printf (" The preorder traversal is : \n");
         preorder (root);
         }
         break;
```

```
case 3: if (root==NULL)
        {
        printf("Tree is empty!");
        }
      else
      {
      printf("Given tree is..\n");
      display(root,1);
      printf("The inorder traversal is:\n");
      inorder(root);
      }
    break;
case 4: if (root==NULL)
        {
        printf("Tree is empty!");
        }
      else
      {
      printf("Given tree is..\n");
      display(root,1);
      printf("The postorder traversal is:\n");
      postorder(root);
      }
    break;
case 5: display(root,1);
        break;
default: printf("Invalid choice entered.\n");
      exit(0);
    }
  }
  return 0;
}
```

OUTPUT SCREENSHOTS:

```
TERMINAL  DEBUG CONSOLE  PROBLEMS  OUTPUT
5.Display
Enter the choice:
5
      6
    78
      3
  23
    56
1.Insert
2.Preorder
3.Inorder
4.Postorder
5.Display
Enter the choice:
2
Given tree is..
      6
    78
      3
  23
    56
The preorder traversal is:
the item is 23
the item is 56
the item is 78
the item is 3
the item is 6
1.Insert
2.Preorder
3.Inorder
4.Postorder
5.Display
Enter the choice:
3
Given tree is..
      6
    78
      3
  23
    56
The inorder traversal is
The item is 56
The item is 23
The item is 3
The item is 78
The item is 6
1.Insert
2.Preorder
3.Inorder
4.Postorder
5.Display
Enter the choice:
4
Given tree is..
      6
    78
      3
  23
    56
The postorder traversal is
```

```
TERMINAL  DEBUG CONSOLE  PROBLEMS  OUTPUT
Snehas-MacBook-Pro:ccp snehasrivastava$ gcc BT.c
Snehas-MacBook-Pro:ccp snehasrivastava$ ./a.out
1.Insert
2.Preorder
3.Inorder
4.Postorder
5.Display
Enter the choice:
1
Enter the item:
23
1.Insert
2.Preorder
3.Inorder
4.Postorder
5.Display
Enter the choice:
1
Enter the item:
56
Give direction to insert..
l
1.Insert
2.Preorder
3.Inorder
4.Postorder
5.Display
Enter the choice:
1
Enter the item:
78
Give direction to insert..
r
1.Insert
2.Preorder
3.Inorder
4.Postorder
5.Display
Enter the choice:
1
Enter the item:
3
Give direction to insert..
rl
1.Insert
2.Preorder
3.Inorder
4.Postorder
5.Display
Enter the choice:
1
Enter the item:
6
Give direction to insert..
rr
1.Insert
2.Preorder
3.Inorder
4.Postorder
5.Display
```

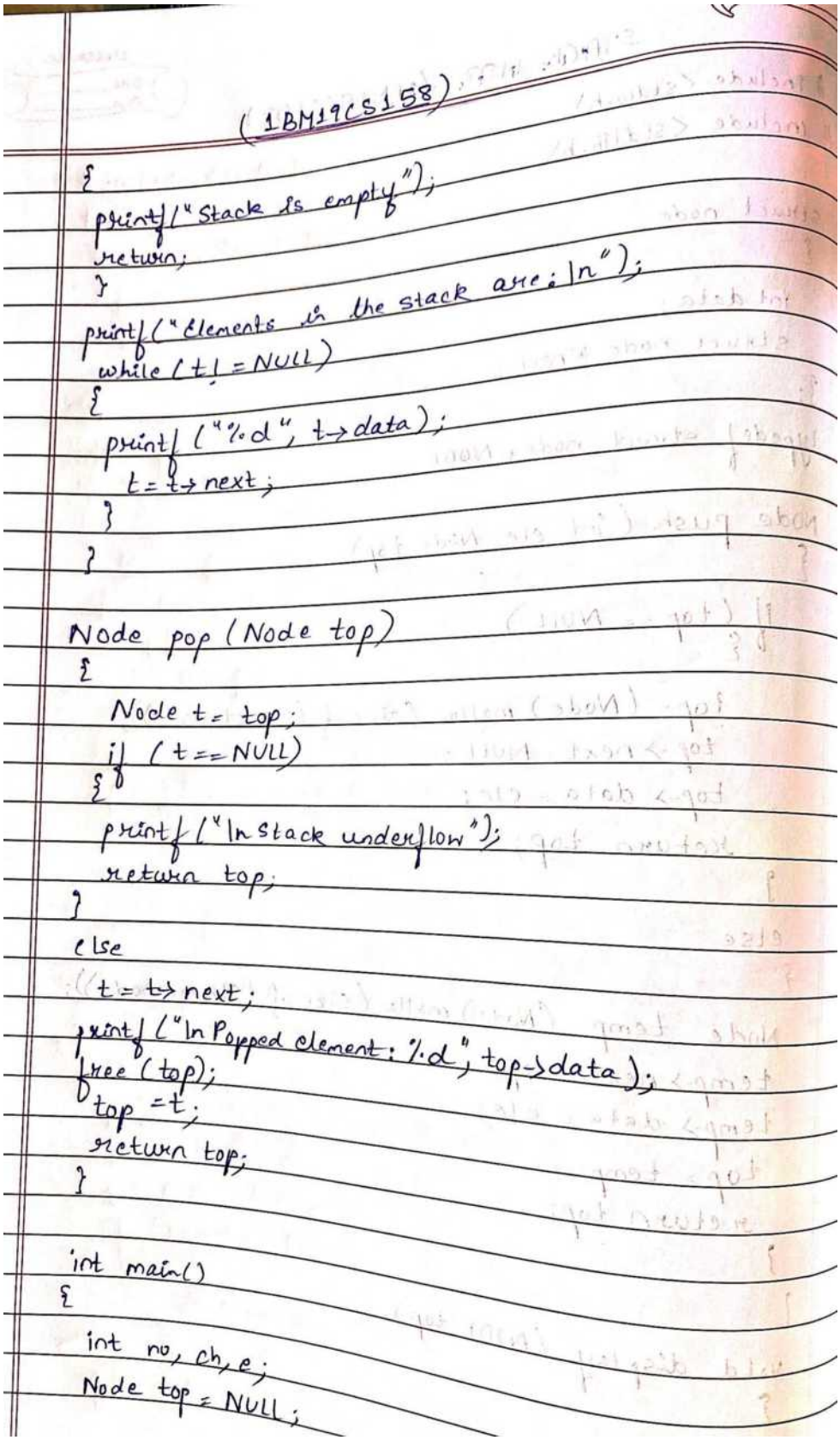

56
The postorder traversal is
The item is 56
The item is 3
The item is 6
The item is 78
The item is 23
1.Insert
2.Preorder
3.Inorder
4.Postorder
5.Display

STACK LIST (1BM19CS158)

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

struct node
{
  int data;
  struct node *next;
};
typedef struct node* NODE;

NOde push (int ele, Node top)
{
  if (top == NULL)
  {
    top= (Node) malloc (sizeof (struct node));
    top -> next = NULL;
    top-> data = ele;
    return top;
  }
  else
  {
  Node temp= (Node) malloc (size of (struct node));
  temp-> next = top;
  temp> data = ele;
   top = temp;
   return top;
  }
}
void display (NODE top)
{
  Node t= top;
  if (t== NULL)
```



```
(1BM19CS158)
{
printf("Stack is empty");
return;
}
printf("Elements in the stack are:\n");
while(t!=NULL)
{
printf("%d", t->data);
t=t->next;
}
}

Node pop(Node top)
{
Node t=top;
if(t==NULL)
{
printf("\n Stack underflow");
return top;
}
else
t=t->next;
printf("\n Popped element: %d", top->data);
free(top);
top=t;
return top;
}

int main()
{
int no, ch, e;
Node top=NULL;
```

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```
while(1)
{
printf("\n1.Push\n2.Pop\n3.Display\n4.Exit");
printf("\n Enter choice:");
scanf("%d", &ch);

switch(ch)
{
case 1: printf("Enter data:");
        scanf("%d", &no);
        top = push(no, top);
        break;
case 2: top= pop(top);
        break;
case 3: display(top);
        break;
case 4: exit(0);
default: printf("Invalid input");
 break;
}
}

return 0;
}
```

OUTPUT SCREENSHOTS:

```
Snehas-MacBook-Pro:ccp snehasrivastava$ gcc stacklist.c
Snehas-MacBook-Pro:ccp snehasrivastava$ ./a.out

 1.Push
 2.Pop
 3.Display
 4.Exit
 Enter choice : 1
 Enter data : 34

 1.Push
 2.Pop
 3.Display
 4.Exit
 Enter choice : 1
 Enter data : 67

 1.Push
 2.Pop
 3.Display
 4.Exit
 Enter choice : 2

 Popped element : 67
 1.Push
 2.Pop
 3.Display
 4.Exit
 Enter choice : 2

 Popped element : 34
 1.Push
 2.Pop
 3.Display
 4.Exit
 Enter choice : 3
Stack is empty
 1.Push
 2.Pop
 3.Display
 4.Exit
 Enter choice : 4
Snehas-MacBook-Pro:ccp snehasrivastava$
```

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QUEUE LIST (1BM19CS158)

```
#include <stdio.h>
#include <stlib.h>
Struct node
{
  int data;
  struct node *next;
};
typedef struct node *NODE;
NODE getnode()
{
  NODE p;
  p= (NODE) malloc (sizeof (struct node));
  if (p!=NULL)
    return p;
  else
  {
   printf ("No memory allocation \n");
   exit(0);
  }
}

NODE enqueue (NODE head, int item)
{
  NODE p,q;
  q=getnode();
  q-> data = item;
  q-> next = NULL;
  if (head == NULL).
    {
      return q;
    }
  p=head;
```

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```
while(p->next != NULL)
  p=p->next;
  p->next = q;
  return head;
}

NODE dequeue (NODE head)
{
  NODE p= head;
  if (head == NULL)
  {
    printf("List is empty\n");
  }
  printf("Deleted element is %d\n", p->data);
  head =p->next;
  free(p);
  return head;
}
void display (NODE head)
{
  NODE p;
  if (head==NULL)
  {
    printf("List is empty\n");
    exit(0);
  }
  p=head;
  while (p!=NULL)
  {
    printf("%d\n", p->data);
    p = p->next;
  }
}
```

(1BM19CS158)

```
int main()
{
NODE p,q, head=NULL;
  p=getnode();
  q=getnode();
  int option, ele, pos, value;
  while(1)
  {
printf("1. Enqueue \n2. Dequeue \n3. Display \n4. Exit\n");
printf("Enter option \n");
scanf("%d", &option);
switch(option)
{
case 1 :printf("Enter element to be inserted \n");
        scanf("%d", &ele);
        head= enqueue(head, ele);
        break;
case 2: head= dequeue(head);
        break;
case 3: printf("Elements in list are\n");
        display(head);
        break;
Case 4: exit(0);
    break;
default: printf("Invalid choice");
    break;
}
}
return 0;
}
```

OUTPUT SCREENSHOTS:

```
Snehas-MacBook-Pro:ccp snehasrivastava$ gcc queuelist.c
Snehas-MacBook-Pro:ccp snehasrivastava$ ./a.out
1.Enqueue
2.Dequeue
3.Display
4.Exit
Enter option
1
Enter element to be inserted
34
1.Enqueue
2.Dequeue
3.Display
4.Exit
Enter option
1
Enter element to be inserted
78
1.Enqueue
2.Dequeue
3.Display
4.Exit
Enter option
3
Elements in list are
34
78
1.Enqueue
2.Dequeue
3.Display
4.Exit
Enter option
2
Deleted element is 34
1.Enqueue
2.Dequeue
3.Display
4.Exit
Enter option
2
Deleted element is 78
1.Enqueue
2.Dequeue
3.Display
4.Exit
Enter option
2
List is empty
```