Lab program 1

write a program to stimulate the working of stack using an array including push, pop, display program should display appropriate

```
#include <stdio.h>
#define STACK_SIZE 5
int top = -1;
int s[10];
int item;
void push()
{
    if (top == STACK_SIZE - 1)
    {
     printf("stack overflow \n");
     return;
    }else{
   top = top + 1;
   s[top] = item;
}}
int pop()
{
```

```
if (top == -1)
{
return -1;
}
else
{
return s[top--];
}
}
void display()
{
int i;
if (top == -1)
{
printf ("stack empty");
return;
}
else
{
printf ("contents of stack \n");
for (i=top; i>=0; i--)
{printf ("%d \n", s[i]);
}
}
}
```

```
int item_deleted;
int choice;
for(;;)
{
printf("\n1: push 2.Pop: 3. display
        4. exit\n");
printf("enter choic\n");
scanf("%d",&choice);
switch(choice)
{
case 1: print("Enter Item: ");
        scanf("%d", &item);
        push();
        break;
case 2: item_deleted = pop()
        if (item_deleted == -1)
        {
        printf("stack. empty\n");
    }
    else
    {
    print("item deleted is %d\n",
            item_deleted);
    }
```

```
        break;
    case 3: display();
            break;
    default : exit()
}
}
getch()
}
```

```
main.c:85:21: warning: implicit declaration of function 'exit' [-Wimplicit-function-decla
main.c:85:21: warning: incompatible implicit declaration of built-in function 'exit'
main.c:85:21: note: include '<stdlib.h>' or provide a declaration of 'exit'
main.c:89:5: warning: implicit declaration of function 'getch' [-Wimplicit-function-decla

1.push 2.pop 3.display 4.exit
enter choice
1
Enter Item : 34

1.push 2.pop 3.display 4.exit
enter choice
3
Contents of stack
34

1.push 2.pop 3.display 4.exit
enter choice
1
Enter Item : 45

1.push 2.pop 3.display 4.exit
enter choice
3
Contents of stack
45
34

1.push 2.pop 3.display 4.exit
enter choice
```

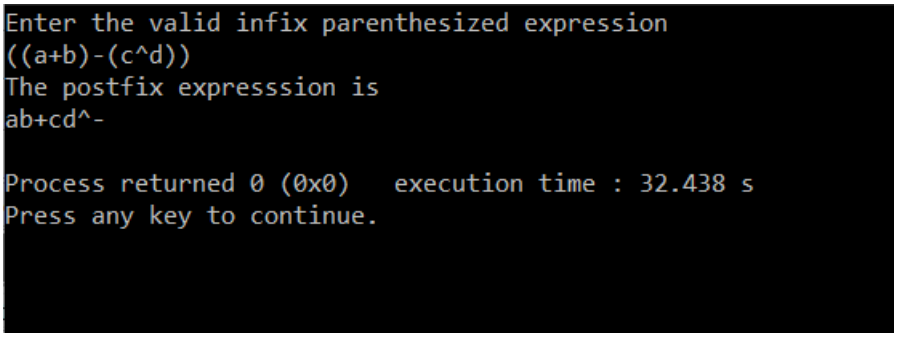
program2

```
#include <stdio.h>
#include <string.h>
int F(char symol)
{
switch (symbol)
{
case '+':
case '-' : return 2;
case '*' :
case '/' : return 4;
case'A' :
case '$' : return 5;
case 'c' : return 0;
case '#' : return -1;
default : return 0;
}
}
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;
}
}
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++
}
if ( F (s [top]) != G (symbol) )
   s [++top] = symbol;
  else
  top--;
 }
```

```
while (s[top] != '#')
{
postfix[i] = '\0';
}
}
int main()
{
char infix[20];
char postfix[20];
printf("Enter the valid parenthesized infix
        expression\n");
scanf("%s", infix);
infix_postfix(infix, postfix);
printf("The postfix expression is\n");
printf("%s\n", postfix);
return 0;
}
```

OUTPUT:


Enter the valid infix parenthesized expression
((a+b)-(c^d))
The postfix expresssion is
ab+cd^-
Process returned 0 (0x0) execution time : 32.438 s
Press any key to continue.

Linear queue

```
#include <stdio.h>
#define MAX 5
int queue[MAX];
int rear = -1, front = -1;
void insert()
{
  int add_item;
  if (rear == MAX-1)
  printf("Queue Overflow \n");
  else
    { if (front == -1)
        front = 0;
    printf("enter the element to be inserted :");
    scanf("%d", &add_item);
    rear = rear + 1;
    queue[rear] = add_item;
  }
}
void delete()
{
  if (front == -1 || front > rear)
    { printf("Queue underflow \n");
      return;
  }
```

```
else
  {printf("Element deleted from queue is: %d\n",
                queue[front]);
   front = front+1;
  }

void display()
{
 int i;
 if (front == -1)
 printf("queue is empty \n");
 else
  {printf("queue is : \n");
  from for (i=front; i<=rear; i++)
        printf("%d\n", queue[i]);
      print("\n");
  }
 }

 main()
 {
  int choice;
  while(1)
  {
   printf("1: INSERT \n");
   printf("2: DELETE \n");
   printf("3 : DISPLAY \n");
   printf("4 : EXIT");
```

```
printf ("Enter your choice :");
scanf ("%d", &choice);
switch (choice)
{
case 1 :
 insert();
 break;
case 2:
delete();
break;
 case 3:
display();
 break;
case 4:
exit(1);
default:
printf("wrong choice\n");
}
}
}
```

```
1:INSERT
2:DELETE
3:DISPLAY
4.EXIT
Enter your choice : 1
Enter the element to be inserted:10
1:INSERT
2:DELETE
3:DISPLAY
4.EXIT
Enter your choice : 1
Enter the element to be inserted:20
1:INSERT
2:DELETE
3:DISPLAY
4.EXIT
Enter your choice : 1
Enter the element to be inserted:30
1:INSERT
2:DELETE
3:DISPLAY
4.EXIT
Enter your choice : 1
Enter the element to be inserted:40
```

```
Enter the element to be inserted:40
1:INSERT
2:DELETE
3:DISPLAY
4.EXIT
Enter your choice : 1
Enter the element to be inserted:50
1:INSERT
2:DELETE
3:DISPLAY
4.EXIT
Enter your choice : 1
Queue Overflow
1:INSERT
2:DELETE
3:DISPLAY
4.EXIT
Enter your choice : 3
Queue is :
10
20
30
40
50

1:INSERT
2:DELETE
3:DISPLAY
4.EXIT
Enter your choice : 2
Element deleted from queue is : 10
1:INSERT
2:DELETE
3:DISPLAY
4.EXIT
Enter your choice : 3
Queue is :
20
30
40
50

1:INSERT
2:DELETE
3:DISPLAY
4.EXIT
Enter your choice :
```

Program 4

Circular Queue

```
#include <stdio.h>
#define q_size 5
int item, front =0, rear =-1 ,q[q_size], count= 0;
void insert_rear()
{ if( count ==q_size)
  {
   printf("Queue Overflow\n");
   return ;
  }
 rear =(rear+1)%q_size ;
  q[rear]=item;
 count++;
  return;
}
int delete_front( )
{ if(count==0)
   return -1;
  else{
    item =q[front];
    front=(front+1) %q_size;
   count =count -1;
    return item;
}
```

```
}
void display()
   [ int i, f;
    if (counter == 0)
     { printf ("Queue is empty \n");
      return;
     }
    f=front;
    printf ("contents of Queue: \n");
    for (i=0; i<=count; i++)
       {
        printf ("%d \n", q[f]);
        f=(f+1) % q-size;
       }
}
void main()
{
int choice;
for (;;)
{
printf (" 1: Insert \n 2: DELETE \n 3: DISPLAY");
printf ("enter the choice \n");
scanf ("%d", &choice);
switch (choice) {
```

```
case 1 : printf ("Enter an element to be Inserted \n");
         scanf ("%d", &item);
         insert_read ();
         break;
case 2 : item=delete_front ();
         if (item == -1)
          printf ("queue is empty \n");
          printf ("item deleted is %d \n", item);
         break;
case 3 : display ();
         break;
default : exit (0);
}
}
}.
```

```
1:INSERT
 2:DELETE
 3:DISPLAY
Enter the choice
1
Enter an element to be inserted
10
1:INSERT
 2:DELETE
 3:DISPLAY
Enter the choice
1
Enter an element to be inserted
20
1:INSERT
 2:DELETE
 3:DISPLAY
Enter the choice
1
Enter an element to be inserted
30
1:INSERT
 2:DELETE
 3:DISPLAY
Enter the choice
1
Enter an element to be inserted
40
1:INSERT
 2:DELETE
 3:DISPLAY
Enter the choice
1
Enter an element to be inserted
50
```

```
1:INSERT
 2:DELETE
 3:DISPLAY
Enter the choice
1
Enter an element to be inserted
60
Queue Overflow
1:INSERT
 2:DELETE
 3:DISPLAY
Enter the choice
3
Content of Queue:
10
20
30
40
50
10
1:INSERT
 2:DELETE
 3:DISPLAY
Enter the choice
2
Item deleted is 10
1:INSERT
 2:DELETE
 3:DISPLAY
Enter the choice
3
Content of Queue:
20
30
40
50
10
1:INSERT
 2:DELETE
 3:DISPLAY
Enter the choice
```

program 5.

```
#include <stdio.h>
#include <stdlib.h>
typedef struct node{
   int data.
   stud node *link;
}node;
node *root = NULL;
void add_at_end ()
{ node *temp;
 temp=(node *) malloc (sizeof (node));
 printf ("Enter the node element \n");
 scanf ("%d ",&temp->data);
 temp -> link = NULL.
 if (root == NULL)
  { root = temp;
 }
 else
  { node *p =root;
   while (p->link != NULL)
    { p = p -> link;
    }
    p -> link = temp;
  }
 }
```

```
void add_at_begin ()
{
  node *temp;
temp = (node*) malloc(sizeof(node));
printf("Enter node element \n");
scanf("%d", &temp->data);
temp->link = null;
if (root == NULL)
  {
   root = temp;
}
else
  {
  temp->link = root;
  root = temp;
}
}

int length ()
{
node *p;
  p = root;
  int i = 0;
  while (p != NULL)
  {
   i++;
   p = p->link;
}
```

```
return L;
}
void add_after ()
{
 node *p, *temp;
 int loc, i=1;
 printf ("Enter the location ");
 scanf ("%d", &loc);
 if (loc > length())
 {
  print ("Invalid location, the list has %d nodes", length());
 }
 else
 {
  p = root;
  while (i<loc)
  {
   p=p->link;
   i++;
  }
 temp = (node *)malloc (sizeof (node));
 printf ("Enter the node element \n");
 scanf ("%d", &temp->data);
 temp->link = NULL;
 temp->link = p->link;
 p->link = temp;
  }
 }
```

```
void delete()
{
int loc;
node *temp;
printf("Enter the location of node to be deleted\n");
scanf("%d",&loc);
 if (loc>length())
{printf("There is no such node\n");
}
else if (loc==1)
{ temp=root;
 root=temp->link;
 temp->link=null;
 free(temp);
 }
 else
 {
 node *p=root,*q;
 int i=1;
 while (i<loc-1)
  {
   p=p->link;
  i++;
 }
  q=p->link;
  p->link=q->link;
 q->link=NULL;
 free(q);
 }
}
```

```
void display()
{
node *temp = root;
if (temp == NULL)
{ printf("NO nodes in the list \n");
}
else
{while (temp != NULL)
  {
   printf("%d \n", temp -> data);
   temp = temp -> link;
  }
}
}
int main()
{
int op, len;
while(1)
{ printf(" Enter the Operation \n1 -Add in begin \n2 add
        at end\n");
printf("3.Add after a node\n 4. Delete node \n 5 -Display
 \n 6. length of list \n7. Exit \n");
 scanf("%d", &op);
 switch (op)
{
case 1 : add_at_begin();
        break;
case 2 : add_at_end();
        break;
```

```
case 3 : add_after();
         break;
case 4 : delete();
         break;
case 5 : display();
         break;
case 6 : len = length();
         printf("the length is %d \n", len);
         break;
case 7 : exit(0)
         break;
default : printf("No such Operation\n");
}
}
return 0;
}
```

```
20
55
88
1:INSERT REAR
2:INSERT FRONT
3:INSERT AT POSITION
4:INSERT BEFORE
5:INSERT AFTER
6:DISPLAY
Enter Your Choice:3

Enter the position before need to be added:1

Enter the item:33
1:INSERT REAR
2:INSERT FRONT
3:INSERT AT POSITION
4:INSERT BEFORE
5:INSERT AFTER
6:DISPLAY
Enter Your Choice:6
30
40
50
33
10
77
20
55
88
1:INSERT REAR
2:INSERT FRONT
3:INSERT AT POSITION
4:INSERT BEFORE
5:INSERT AFTER
6:DISPLAY
Enter Your Choice:
```

```
88
1:INSERT REAR
2:INSERT FRONT
3:INSERT AT POSITION
4:INSERT BEFORE
5:INSERT AFTER
6:DISPLAY
Enter Your Choice:4
Enter the item need to be search:20

Enter the item:77
1:INSERT REAR
2:INSERT FRONT
3:INSERT AT POSITION
4:INSERT BEFORE
5:INSERT AFTER
6:DISPLAY
Enter Your Choice:6
30
40
50
10
77
20
88
1:INSERT REAR
2:INSERT FRONT
3:INSERT AT POSITION
4:INSERT BEFORE
5:INSERT AFTER
6:DISPLAY
Enter Your Choice:5

Enter the item need to be search:20

Enter the item:55
1:INSERT REAR
2:INSERT FRONT
3:INSERT AT POSITION
4:INSERT BEFORE
5:INSERT AFTER
6:DISPLAY
Enter Your Choice:6
30
40
50
10
77
20
```

```
Enter Your Choice:6
30
40
50
10
20
1:INSERT REAR
2:INSERT FRONT
3:INSERT AT POSITION
4:INSERT BEFORE
5:INSERT AFTER
6:DISPLAY
Enter Your Choice:3

Enter the position before need to be added:3

Enter the item:88
1:INSERT REAR
2:INSERT FRONT
3:INSERT AT POSITION
4:INSERT BEFORE
5:INSERT AFTER
6:DISPLAY
Enter Your Choice:6
30
40
50
10
20
88
1:INSERT REAR
2:INSERT FRONT
3:INSERT AT POSITION
4:INSERT BEFORE
5:INSERT AFTER
6:DISPLAY
Enter Your Choice:4
Enter the item need to be search:30

Enter the item:45
1:INSERT REAR
2:INSERT FRONT
3:INSERT AT POSITION
4:INSERT BEFORE
5:INSERT AFTER
6:DISPLAY
Enter Your Choice:6
30
40
50
```

```
1:INSERT REAR
2:INSERT FRONT
3:INSERT AT POSITION
4:INSERT BEFORE
5:INSERT AFTER
6:DISPLAY
Enter Your Choice:1

Enter the item:10
1:INSERT REAR
2:INSERT FRONT
3:INSERT AT POSITION
4:INSERT BEFORE
5:INSERT AFTER
6:DISPLAY
Enter Your Choice:1

Enter the item:20
1:INSERT REAR
2:INSERT FRONT
3:INSERT AT POSITION
4:INSERT BEFORE
5:INSERT AFTER
6:DISPLAY
Enter Your Choice:2
Enter the item:50
1:INSERT REAR
2:INSERT FRONT
3:INSERT AT POSITION
4:INSERT BEFORE
5:INSERT AFTER
6:DISPLAY
Enter Your Choice:2
Enter the item:40
1:INSERT REAR
2:INSERT FRONT
3:INSERT AT POSITION
4:INSERT BEFORE
5:INSERT AFTER
6:DISPLAY
Enter Your Choice:2
Enter the item:30
1:INSERT REAR
2:INSERT FRONT
3:INSERT AT POSITION
4:INSERT BEFORE
5:INSERT AFTER
6:DISPLAY
Enter Your Choice:6
30
```

Program 6

```
#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(" memory is full ");
  exit(0);
 }
return x;
}
NODE delete_front (NODE first)
{if (first==NULL){printf("List is empty "); return;}
  NODE temp;
  temp = first->link;
  free(first);
  return temp;
}
```

```
NODE delete_rear (NODE first)
{
  if (first == NULL)
  {
    printf (" List is empty ");
    return ;
  }
NODE temp, prev ;
 temp = first
 while (temp != NULL)
   { prev = temp ;
    temp = temp -> link ;
 }
  prev -> link = NULL ;
  free (temp) ;
  return first;

}
NODE  insert (NODE first)
  { int info;
    NODE temp ; temp = getnode( );
    printf (" Enter the item. ");
    scanf (" %d ", &info );
   temp -> info  = info;
   temp -> link = first ;
   return temp ;

  }.
```

```
NODE delete_at_pos ( NODE first )
{
 int pos, i ;
 NODE temp, prev
 printf ( " enter the position : " ) ;
 scanf ( " %d ", &pos ) ;
 temp = first
  for ( int i=0 ; i <= pos ; i++ )
     { prev = temp ;
       temp = temp -> link ;
     } if ( temp == NULL )
     { printf ( " deletion is not possible " ) ; return first ; }
   prev -> link = temp -> link ;
    free ( temp ) ;
 return first ;
}
```

```
NODE delete_item (NODE
{
if (first == NULL)
{ printf("list is empty" );
return first;
} NODE temp = first; int flag = 0; NOD prev = NULL;
  NODE ptr;
while (temp != NULL )
{
  if ( temp ->info == key )
  {
    ptr = temp->link;
    prev ->link = ptr;
    free (temp);
    flag = 1
  }
  prev = temp;
  temp = temp ->link;
}
if (flag == 0)
{ printf( " Element is not found in list");
return first;
}
```

```
int main()
{
 int choice, item, pos;
 NODE first = NULL;
 for(;;)
 printf("1: Insert \n 2: Delete front \n 3:
        Delete Rear \n 4: Delet at position \n 5:
        Delete specified item \n");
 printf("\nEnter the choice \n");
 scanf("%d", &choice);
 switch(choice)
  {
  case 1 : insert(first);
           break;
  case 2 : delete_front (first);
           break;
  case 3 : delete_rear (first);
           break;
  case 4: delete_at_pos (first);
          break;
  case 5 : printf("enter the item :");
           scanf("%d", &item);
           first = delete_item (first, item);
           break;
  case 6 : exit(0);
  default : break;
  }
}
```

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 ("memory is full");
    exit(0);
  }
 return x;
}
NODE insert (NODE first)
{
  int item;
    NODE temp;
    temp = getnode();
    printf ("enter the item to insert : );
     scanf ("%d", &item);
    temp -> info = item;
```

```
void reverse(~~int~~ NODE first)
{
 NODE cur = first;
 NODE prev = NULL;
 NODE NEXT = NULL;
while (cur != NULL) {
    next = cur->link;
    cur->link = prev;
     prev = cur;
   cur = next;
}
 ~~first~~ = prev;
}
void sort (NODE first)
{
   NODE cur, indent,
    int temp;
   if (~~first~~ == NULL) {
      return;
   }
```

```
while (cur != NULL)
{
  indent = cur->link;
  if (cu->info > inden->info)
  {
    temp = cur->info;
    cur->info = inden->info;
    inden->info = temp;
  }
  inden = indent->link;
}
cur = cur->link;
}
}
}
display (NODE first)
{NODE temp = first
 while(temp != NULL)
{ printf ("%d\t", temp->data);
 temp = temp->link;
}
}
```

```
void concant (NODE first, NODE second)
{
if (first == NULL)
  return second;
 if (second == NULL)
   return first;
 NODE temp = first;
  while (temp != NULL)
    temp = temp -> link;
 temp ->link =second;
 return first;
}
Void main () {
int choice; NODE first = NULL ; NODE second=NULL;
for (;;)
{
printf ( 1:INSERT first \n 2:INSERT second\n
 3:Deletefirst \n 4:Delete second \n 5:reverse first
\n6: reverse second \n 7:sort first \n 8:sort
 second \n 9:concat\n10: display );
scanf ("%d", &choice);
```

```
switch (choice)
{
case 1 : Insert (first);
         break;
case 2 : insert (second);
         break;
case 3 : delefecnode (first);
         break;
case 4 : delete-node (second);
         break;
case 5 : reverse (first);
         break;
case 6 : reverse (second);
         break;
case 7 : sort (first);
         break;
case 8 : sort(second);
         break;
case 9 : concat (first, second);
         break;
case 10 : display (first)
          break;
```

program 8

implementation of stack;

```
#include <stdio.h>
#include <stdlib.h>
struct node{
 int info;
 struct node* link;
 };
 typedef structnode* NODE;
NODE getnode()
 {
  NODE x;
  x = (NODE) malloc(size of(struct node));
  if (x==NULL)
   { printf ("memory is full");
     exit (0);
   }
  return x;
 }
void insert push (NODE list)
  {
   NODE temp, cur; int item;
   cur = getnode();
   printf("enter the item:");
   scanf("%d", &item);
```

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

NODE pop ( NODE first )
{ if (first == NULL) { printf("List is empty"); return;}
  NODE temp, prev=NULL;
  temp = first;
  while (temp != NULL) { prev = temp;
  temp = temp -> link; }
  prev -> link = NULL;
  free (temp);
  return first;
}
```

```
NODE display1(NODE first)
{
 NODE temp;
if(first==NULL) {printf("Empty list"); return first;
 temp = first;
 while (temp != NULL),
  {
   printf ("%d \t", temp->info);
   temp = temp->link;

  } return first;
 }

void main()
 {
  int choice;
  NODE first=NULL;
  for(;;)
  {
  printf("1: Push \n 2: Pop \n 3: DISPLAY");
  scanf("
 printf("Enter your choice:");
scanf("%d",&choice);
Switch(choice)
 {
```

```
case 1: push(first);
        break;
case 2: first = pop(first);
        break;
case 3: first = display(first);
        break;
default: break;
   }
}
```

```
1:PUSH
2:POP
3:DISPLAY
Enter the choice:
1
Enter the ELement:20

1:PUSH
2:POP
3:DISPLAY
Enter the choice:1
Enter the ELement:30

1:PUSH
2:POP
3:DISPLAY
Enter the choice:1
Enter the ELement:40

1:PUSH
2:POP
3:DISPLAY
Enter the choice:1
Enter the ELement:50

1:PUSH
2:POP
3:DISPLAY
Enter the choice:3
10      20      30      40      50
1:PUSH
2:POP
3:DISPLAY
Enter the choice:2
Item deleted is 50
1:PUSH
2:POP
3:DISPLAY
Enter the choice:3
10      20      30      40
1:PUSH
2:POP
3:DISPLAY
Enter the choice:2
Item deleted is 40
1:PUSH
2:POP
3:DISPLAY
Enter the choice:3
10      20      30
```

Implementation Queue :-

```
#include <stdio.h>
#include <stdlib.h>
struct node
{
  int info;
  struct node * link;
};
type def struct node * NODE;
NODE getnode ()
{
 NODE x;
 x = (NODE) malloc (sizeof(struct node));
 if (x == NULL)
 {
  printf ("memory is full");
  exit (0);
 }
 return x;
}
```

```
NODE insert (NODE first, int item);
{
  NODE temp, cur;
  cur = getnode;
  cur -> info = item;
  cur -> link = NULL;
  if (first == NULL)
    { return first;
    }
  temp = first;
  while (temp != NULL)
  { temp = temp -> link;
  }
  temp -> link = cur;
  return first;
}
```

```
NODE delete_ (NODE first)
{ if(first==NULL){printf("list is empty"); return ;}
  NODE temp = first->link;
  free(first)
  return temp;
}

void display(NODE first)
{
  NODE temp=first;
  if (temp == NULL)
  {printf("empty list");
   return;
  }
  while (temp != NULL)
  {
   printf("%d \t", temp->info);
  temp = temp -> link;
}
}
```

```
int main()
{
  int choice, item;
  NODE first = NULL;
for(;;)
{
printf("1 : Insert \n 2 : Delete \n 3 : Display");
printf("enter the item : ");
scanf("%d", &choice);
switch (choice)
    {
      case 1 : printf("enter the item: ");
               scanf("%d", &item);
               first = insert(first, item);
               break;
      case 2 : Delete(first); break;
      case 3 : Display_(first); break;
      default : break;
    }
}
}
```

```
1:INSERT
2:DELETE
3:DISPLAY
Enter the choice:1
Enter the ELement:20

1:INSERT
2:DELETE
3:DISPLAY
Enter the choice:1
Enter the ELement:30

1:INSERT
2:DELETE
3:DISPLAY
Enter the choice:1
Enter the ELement:40

1:INSERT
2:DELETE
3:DISPLAY
Enter the choice:1
Enter the ELement:503

1:INSERT
2:DELETE
3:DISPLAY
Enter the choice:3
10      20      30      40      503
1:INSERT
2:DELETE
3:DISPLAY
Enter the choice:2

1:INSERT
2:DELETE
3:DISPLAY
Enter the choice:3
20      30      40      503
1:INSERT
2:DELETE
3:DISPLAY
Enter the choice:2

1:INSERT
2:DELETE
3:DISPLAY
Enter the choice:3
30      40      503
```

program 9

LAB 9
1BM19CS162

```
#include < stdio.h>
#include < stdlib.h>
struct node {
        int info ;
        struct node * rlink;
        struct node * llink;
    };
typedef struct node * NODE;
NODE getnode ()
  {
    NODE x;
   x = (NODE)malloc ( sizeof(struct node)) ;
   if (x==NULL)
      {
        printf ("memory full \n");
        exit(0);
      }
      return x ;
  }
void freenode (NODE x )
    {
      free(x);
    }
NODE 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 insert_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 delete_front (NODE head)
{
    NODE cur, nent;
    if (head->rlink == head)
    {
        printf ("dq empty\n");
        return head;
    }
    cur = head->rlink;
    nent = cur->rlink;
    head->rlink = nent;
    nent->llink = head;
    printf ("node deleted is %d", cur->info);
    freenode (cur);
    return head;
}
```

```
        count++;
        if (temp->infor == key)
        {
            flag = 1;
            printf("key %d found in position %d", key,
                    count);
        }
        temp = temp->rlink;
    }
    if (flag == 0)
    {
        printf("key is not found in list");
    }
    return first;
}
NODE insert_after (NODE first)
{
    int key, item, flag=0;
    printf("Enter the element: ");
    scanf("%d", &key);
    NODE temp = first->rlink;
    NODE ptr = getnode();
    while (temp != first)
    {
        if (temp->info == key)
        {
            printf("Enter the item need to be inserted: ");
            scanf("%d", &item);
            ptr->info = item;
            ptr->rlink = temp->rlink;
            ptr->llink = temp;
            temp->rlink = ptr;
```

```
        flag = 1;
        return first;
    } temp = temp->rlink;
}
if (flag == 0)
    printf ("There is no such element");
    return first;
}
NODE insert_after (NODE first)
{
    int key, item, flag = 0;
    printf ("Enter the element : ");
    scanf ("%d", &key);
    NODE temp = first->rlink;
    NODE ptr = getnode();
    while (temp != first)
    {
        if (temp->info == key)
        {
            printf ("Enter the item need to be inserted");
            scanf ("%d", &item);
            ptr->info = item;
            ptr->rlink = temp;
            ptr->llink = temp->llink;
            ptr->llink = ptr;
            flag = 1;
            return first;
        }
        temp = temp->rlink;
    }
```

```
case 5 : display(head);
         break;
case 7 : delete_dup(head);
         break;
case 8 : len = length(head);
         break;
case 9 : head = search(head);
         break;
case 10 : head = insert_after(head);
          break;
case 11 : head = insert_before(head);
          break;
default : break
  }
 }
}
```

```
NODE head, last;
int item, choice, len;
head = getnode();
   head->rlink = head;
   head->llink = head;
  for(;;)
{
printf("\n1: insert front \n2: insert rear \n3
    3: delete front \n4: delete rear \n5: display
    \n6: exit \n7: delete duplicate items \n8:
     insert before \n 11: insert after \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 = delete_front(head);
        break;
case 4: last = delete_rear(head);
        break;
```

```
9:search
10:insert Before
11:insert after
12:Delete a value
enter the choice
12
Enter the element need to be deleted:10

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:exit
7:delete duplicate items
8:Length
9:search
10:insert Before
11:insert after
12:Delete a value
enter the choice
5
contents of dq
30      20

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:exit
7:delete duplicate items
8:Length
9:search
10:insert Before
11:insert after
12:Delete a value
enter the choice
```

```
11:insert after
12:Delete a value
enter the choice
8
Length of list is 3
1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:exit
7:delete duplicate items
8:Length
9:search
10:insert Before
11:insert after
12:Delete a value
enter the choice
9
Enter the KEY :10
key 10 found in position 3
1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:exit
7:delete duplicate items
8:Length
9:search
10:insert Before
11:insert after
12:Delete a value
enter the choice
9
Enter the KEY :100
Key is not found in list
1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:exit
7:delete duplicate items
8:Length
9:search
10:insert Before
11:insert after
12:Delete a value
```

```
enter the choice
5
contents of dq
30      20      30      20      10

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:exit
7:delete duplicate items
8:Length
9:search
10:insert Before
11:insert after
12:Delete a value
enter the choice
7

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:exit
7:delete duplicate items
8:Length
9:search
10:insert Before
11:insert after
12:Delete a value
enter the choice
5
contents of dq
30      20      10

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:exit
7:delete duplicate items
8:Length
9:search
10:insert Before
11:insert after
12:Delete a value
```

```
enter the choice
5
contents of dq
30      20      10

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:exit
7:delete duplicate items
8:Length
9:search
10:insert Before
11:insert after
12:Delete a value
enter the choice
1
enter the item at front end
20

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:exit
7:delete duplicate items
8:Length
9:search
10:insert Before
11:insert after
12:Delete a value
enter the choice
1
enter the item at front end
30

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:exit
7:delete duplicate items
8:Length
9:search
10:insert Before
```

```
12:Delete a value
enter the choice
5
contents of dq
10

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:exit
7:delete duplicate items
8:Length
9:search
10:insert Before
11:insert after
12:Delete a value
enter the choice
1
enter the item at front end
20

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:exit
7:delete duplicate items
8:Length
9:search
10:insert Before
11:insert after
12:Delete a value
enter the choice
1
enter the item at front end
30

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:exit
7:delete duplicate items
8:Length
9:search
10:insert Before
```

```
11:insert after
12:Delete a value
enter the choice
3
the node deleted is 20
1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:exit
7:delete duplicate items
8:Length
9:search
10:insert Before
11:insert after
12:Delete a value
enter the choice
5
contents of dq
10      70

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:exit
7:delete duplicate items
8:Length
9:search
10:insert Before
11:insert after
12:Delete a value
enter the choice
4
the node deleted is 70
1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:exit
7:delete duplicate items
8:Length
9:search
10:insert Before
11:insert after
12:Delete a value
enter the choice
```

```
5
contents of dq
20      10

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:exit
7:delete duplicate items
8:Length
9:search
10:insert Before
11:insert after
12:Delete a value
enter the choice
2
enter the item at rear end
70

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:exit
7:delete duplicate items
8:Length
9:search
10:insert Before
11:insert after
12:Delete a value
enter the choice
5
contents of dq
20      10      70

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:exit
7:delete duplicate items
8:Length
9:search
10:insert Before
11:insert after
12:Delete a value
```

```
1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:exit
7:delete duplicate items
8:Length
9:search
10:insert Before
11:insert after
12:Delete a value
enter the choice
1
enter the item at front end
10

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:exit
7:delete duplicate items
8:Length
9:search
10:insert Before
11:insert after
12:Delete a value
enter the choice
1
enter the item at front end
20

1:insert front
2:insert rear
3:delete front
4:delete rear
5:display
6:exit
7:delete duplicate items
8:Length
9:search
10:insert Before
11:insert after
12:Delete a value
enter the choice
5
contents of dq
```

program 10

Binary Search Tree

```
#include <stdio.h>
#include <stdlib.h>
struct node {
   int key;
   struct node * left, *right;
  };
struct node * newNode (int item)
 {
  struct node * temp =(struct node *)malloc(sizeof
                                  (struct node));
  temp -> key =item;
  temp -> left = temp->right= NULL;
  return temp;
}
void inorder ( struct node* root)
{ if(root != NULL) {
     inorder(root->left);
     printf("%d \t", root->key);
     inorder(root->right);

   }
  if (root == NULL)
   {
    printf("Tree is empty\n");
    return;
} }
```

```
void preorder (struct node * root).
  { if (root != NULL) {
      printf ("%d \t", root->key);
      preorder (root->left);
      preorder( root -> right );
    }
    if (root == NULL)
      {
        printf ("Tree is empty \n");
        return;
        }
  }
void postorder ( struct node* root )
  {
      if (root != NULL) {
        return now
      post order - (root->left);
     postorder (root -> right);
     printf ("%d \t", root->key);
  }
}
```

```
struct node * insert (struct node * node, int key)
{ if (node == NULL)
      return newNode(key);
  if (key < node -> key)
      node -> left = insert(node -> left, key);
  else if (key > node -> key)
      node -> right = insert (node -> right, key);
  return node;
}
int main()
{
int ch;
int item;
struct node * root = NULL;
for (;;)
{
printf ("1: Create tree \n2: Insert \n3: InOrder \n4:
        preorder \n 5: Postorder \n");
printf("Enter your choice:");
scanf("%d", &ch);
switch(ch)
{
case 1: printf ("Enter the name :");
        search ("%d", &item);
    root = insert (root, item);
    break;
```

```
        case 2 : printf ("Enter the item: ");
                 scanf ("%d", &item);
                 insert(root, item);
                 break;
        case 3 : inorder (root);
                 break;
        case 4 : preorder(root);
                 break;
        case 5 : postorder(root);
                 break;
        default : break;
        }
    }
    return 0;
}
```

```
1:Create Tree
2:INSERT
 3:INorder
4:PREorder
5:POSTorder
Enter your choice:1
Enter the item:10
1:Create Tree
2:INSERT
 3:INorder
4:PREorder
5:POSTorder
Enter your choice:2
Enter the item:8
1:Create Tree
2:INSERT
 3:INorder
4:PREorder
5:POSTorder
Enter your choice:2
Enter the item:6
1:Create Tree
2:INSERT
 3:INorder
4:PREorder
5:POSTorder
Enter your choice:2
Enter the item:8
1:Create Tree
2:INSERT
 3:INorder
4:PREorder
5:POSTorder
Enter your choice:2
Enter the item:5
1:Create Tree
2:INSERT
 3:INorder
4:PREorder
5:POSTorder
Enter your choice:2
Enter the item:7
```

```
1:Create Tree
2:INSERT
 3:INorder
4:PREorder
5:POSTorder
Enter your choice:2
Enter the item:12
1:Create Tree
2:INSERT
 3:INorder
4:PREorder
5:POSTorder
Enter your choice:2
Enter the item:14
1:Create Tree
2:INSERT
 3:INorder
4:PREorder
5:POSTorder
Enter your choice:2
Enter the item:13
1:Create Tree
2:INSERT
 3:INorder
4:PREorder
5:POSTorder
Enter your choice:3
5       6       7       8       10      12      13      14      1:Create Tree
2:INSERT
 3:INorder
4:PREorder
5:POSTorder
Enter your choice:4
10      8       6       5       7       12      14      13      1:Create Tree
2:INSERT
 3:INorder
4:PREorder
5:POSTorder
Enter your choice:5
5       7       6       8       13      14      12      10      1:Create Tree
2:INSERT
 3:INorder
4:PREorder
5:POSTorder
Enter your choice:
```