ASSIGNMENT-4

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1) Write a program to insert and delete ain element at the m^{th} and k^{th} position in a linked list where m and k is taken from user.

Sol

```
#include <stdio.h>
#include <stdlib.h>
struct node
{
  struct node *next;
};
struct node *curr, *temp;
void input(struct nodes)
void delete(struct nodes)
void main(void)
{
 struct node *s;
 int m;
 s=Null;
 do
 {
  printf("Enter the element to insert;\n:");
  printf("2.Delete\n");
  printf("3.Exit\n");
  printf("Enter the choice:");
  scanf("%d", &m);
     switch(m)
     {
      case 1: input(s);
              break;
      case 2: delete(s);
              break;
     } while(m!=3)
}
```

```
void input(struct node *z)
{
 int pos, c=1
 curr = z;
 printf("Enter the element to be inserted:");
 scanf("%d", &pos);
    while(curr->next!=Null)
    {
     c++;
     if(c==pos)
     {
     temp=(struct node*)malloc(sizeof(struct node));
      printf("Enter the numbers:");
      scanf("%d", &temp->n);
      temp->next = curr->next;
       curr->next = temp;
       break;
     }
   }
  }
void delete(struct node *z)
{
 int pos, c=1;
 curr=z;
 printf("Enter the element to be delete:");
 scanf("%d", &pos);
 while(curr->next!=Null)
 {
  c++;
  if(c==pos)
 {
temp= current->next;
curr->next = curr->next->next;
```

```
    free(temp)
    }
    curr = curr→next;
}
void merge(struct node * p, struct node * q)
{
struct node * p_curr = p, * q_curr = * q;
struct node *p_next, * q_next;
while (p_curr = Null && q_curr != Null)
{
p_next = p_curr → next;
q_next = q_curr → next;
q_curr → next = p_next;
p_curr → next = q_curr;
p_curr = p_next;
q_curr = q_next;
}
* q = q_curr
}
int main()
{
struct node * p = Null, * q = Null;
push(&p,3);
push(&p,5);
push(&p,6);
printf("first linked list:\n");
print list(&);
push(&q,7);
push(&q,8);
push(&q,9);
printf("second linked list:\n");
```

```
print list(q);
merge(p, &q);
printf("modified first linked list = \n");
print list(p);
printf("modified second linked list = \n");
print list(q);
return 0;
}
```

2) Construct a new linked list by merging alternatives nodes of two lists for example in list 1. we have {1,2,3} and in list 2 we have {4,5,6} in the new list we should have {1,4,2,5,3,6}

Sol:-

```
#include <stdio.h>
#include <stdlib.h>
#include <assert.h>
struct node
{
  int data;
  struct node * next;
};
void move node(struct node **x; struct node **y);
struct node * sorted merge(struct node *a,
                           struct node *b)
{
  struct node dummy;
  struct node *tail = &dummy;
  dummy.next = Null;
  while(1)
{
```

```
    if(a==Null)
    {
      *y=newnode->next;
      newnode->next=*x;
       *x=newnode;
    }
Void push(struct node** head-ref, int new-data)
{
struct node* new_node=(struct node*) malloc
                              (size of(struct node));
new_node->data=new-data;
new_node->next=(*head-ref);
 (*head-ref)=new_node;
}
Void point list(struct node* node)
{
while(node!=Null)
{
 printf("%d", node->data);
 node=node->next;
}
}
  tail->next=b;
   break;
}
else if(b==Null)
{
  tail->next=a;
   break;
}
if(a->data<=b->data)
{
```

```
        move node(&(tail)->next, &a);
    }
    else
    {
        move node(&(tail)->next; &b);
    }
    tail = tail->next;
    }
    return (dummy next);
}
Void move node *(struct node **x, struct node
                                        **y)
{
    struct node * newnode = *y;
    assert(newnode != Null);
    int main( )
    {
    struct node * res=null;
    struct node * a=Null;
    struct node* b=Null;
    push(&a,3);
    push(&a, 4);
    push(&a, 5);
    push(&a, 7);
    push(&a, 10);
    push(&a, 20);
    res-sorted merge(a,b);
    printf("merge linked list is:\n");
    print list(res);
    return 0;
}
```

3) Find all the elements in the stack whose sum is equal to k (where k is given from user)

Sol:-

```
#include <stdio.h>
int s1[10], top1 = -1, s2[10], top = -1;
int s1empty()
{
  if (top1 == -1)
     return 1;
  else
     return 0;
}
int s1top()
{
  return s1[top0];
}
int s1pop()
{
  top1--;
}
int s1push(int x)
{
   s1[++top1] = x;
}
int s2empty()
{
   if(top2 == -1)
     return 1;
   else
     return 0;
}
```

```
int S2 top()
{
 return S2[top2];
}
 int S2 pop()
{
 top2--;
}
int S2 push(int x)
{
 S2[++top2] = x;
}
int sum(int k)
{
 int x;
 while(S1 empty() != 1)
  {
    x = S1 top();
    S1 pop();
   while(S1 empty() != 1)
   {
    if(x + S1 top() = k)
    {
     printf("%d, %d)|n", x, S1 top();
    }
    S2 push(S1 top());
     S1 pop();
   }
   while(S2 empty() != 1)
   {
```

```
            s1.push(s2.top());
            s2.pop();
          }
        }
    }
int main()
{
  int n, i, e, k;
  printf("enter the no.of elements of stack:\n");
  scanf("%d", &n);
  for(i=0; i<n; i++)
  {
    scanf("%d", &e);
    s1.push(e);
  }
  printf("enter the value of constant sum:\n");
  scanf("%d", &k);
  printf("the combinations whose sum is equal
                          to k is:\n");
  sum(k);
}
```

4) Write a program to print the elements in a queue (i) in reverse order
(ii) in alternate order

Sol:- (i)

```
#include <stdio.h>
#include "stack.h"
#include "QQ.h"
int main()
{
 int n, arr[20], i, j = 0;
 struct stacks;
 initstack(&s);
 printf("Enter no");
 scanf("%d", &n);
 for(i=0; i<n, i++)
 {
  printf("Enter values:");
  scanf("%d", &arr[i]);
 }
 for(i=0; i<n; i++)
 {
  insert(arr[i]);
 }
 while(j = n)
 {
  push(&s, del());
  j++;
 }
 print("Reverse is");
 while(stop != -1)
```

```
    {
     printf("%d", pop(&s));
    }
    printf("\n");
  return 0;
}
```

(ii)
```
#include <stdio.h>
#include <stdlib.h>
struct node{
  int data;
  struct Node * next;
}
void print nodes(struct Node * head)
{
  int count=0;
  while(head != Null)
  {
    if(count%2==0){
     printf("%d", head→data);
    }
    count++;
    head = head→next;
  }
}
void push(struct Node** head_ref, int new_data)
{
  struct node* new_node = (struct node*)
                    malloc(size of(struct node));
  new_node→data = new_data;
  new_node→next = (*head_ref);
  (*head_ref) = new_node;
}
```

```
int main()
{
struct node * head = Null;
push(&head, 10);
push(&head, 20);
push(&head, 30);
push(&head, 40);
push(&head, 50);
print node(head);
return 0;
}
```

5) (i) How array is different from the linked list.

(ii) write a program to add the first element of one list to another list of example we have {1,2,3} in list 1 and {4,5,6} in list 2 we have to get {4,1,2,3} as output for list 1 and {5,6} for list 2.

Sol:- (i) The major difference b/w Array and linked lists regards to their structure, Arrays are index based data structure where each element associated with an index on the other hand, linked list relies on reference to the previous and next element

(ii)

```
#include <stdio.h>
#include <stdlib.h>
struct node
{
  int data;
  struct node *next;
}
void push(struct node ** head_ref, int new_dat
                                        a)
{
  struct node ** new_node = (struct node *) malloc
                          (sizeof (struct node));
  new_node -> data = new_data;
  new_node -> next = (*head_ref);
  (*head_ref) = new_node;
}
void print list (struct node *head)
{
  struct node * temp = head;
  while (temp != Null)
  {
    printf("%d", temp -> data);
    temp = temp -> next;
  }
  printf("\n");
}
```