

ASSIGNMENT-4

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

Ans:-

```
#include <stdio.h>
#include <stdlib.h>
void ans (node*, int, int)
int size = 0;
struct node {
    int data;
    struct node *next;
}
node* get node (int data)
{
    node* newnode = (struct node*) malloc(sizeof(struct node));
    newnode->data = data;
    newnode->next = NULL;
    return newnode;
}
void ins (node* current, int pos, int data)
{
    if (pos < 1 || pos > size + 1)
        printf ("Invalid");
    else
    {
        while (pos-- > 1)
        {
            if (pos == 0)
            {
                node* temp = get node (data);
                temp->next = *current;
                *current = temp;
            }
        }
    }
}
```

else

```
{  
    Current = &(*Current) → next;  
}
```

Size++;

```
}
```

```
}
```

void printf(struct node* head)

```
{  
    while (head != null)  
    {  
        printf("%d", head → data);  
        head = head → next;  
    }  
    printf("\n");  
}
```

void del(struct node* head, int pos)

```
{  
    if (head == null)
```

```
return;
```

```
temp = head;
```

```
if (pos == 0)
```

```
{
```

```
* head = temp → next;
```

```
free(temp);
```

```
return;
```

```
for (int i = 0; temp != null && i < pos - 1; i++)
```

```
temp = temp → next;
```

```
free(temp → next);
```

```
temp → next = temp → next → next;
```

```
}
```

int main()

```
{
```

```

struct node * head = NULL;
push (& head, 7);
push (& head, 8);
push (& head, 6);
ins (& head, 7, 15);
del (& head, 4);
printlist (head);
return (0);
}

```

Q.2 Construct a new linkedlist by merging alternate 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 we should have {1,4,2,5,3,6}.

Ans:-

```

#include <stdio.h>
#include <stdlib.h>
struct node {
    int data;
    struct node * next;
}
void printlist (struct node * head)
{
    struct node * ptr = head;
    while (ptr)
    {
        printf ("%d->", ptr->data);
        ptr = ptr->next;
    }
    printf ("NULL\n");
}
void push (struct node * head, int data)
{

```



```
struct node* new = (struct node*) malloc (size of  
new → data = data; (struct node));
```

```
new → next = *head;  
*head = new;
```

```
}
```

```
struct node* merge (struct node* a, struct node* b)
```

```
{ struct node dummy;  
  struct node* fail = dummy;
```

```
  dummy.next = NULL;
```

```
  while (1) {
```

```
    if (a == NULL)
```

```
    {
```

```
      tail → next = b;
```

```
      break;
```

```
    }
```

```
    elseif (b == NULL)
```

```
    {
```

```
      tail → next = a;
```

```
      break;
```

```
    }
```

```
    else
```

```
    {
```

```
      tail → next = a;
```

```
      tail = a;
```

```
      a = a → next;
```

```
      tail → next = b;
```

```
    }
```

```
  }
```

```
  return dummy.next;
```

```
}
```

```
Void main( )
```

```
{
```

```

int keys[] = {1, 2, 3, 4, 5, 6, 7};
int n = size of (keys) / size of key[0];
struct node* a = NULL, *b = NULL;
for (int i = n-1; i > 0; i = i-2)
    push(&a, keys[i]);
for (int i = n-2; i >= 0; i = i-2)
    push(&b, keys[i]);
struct node* head = merge(a, b);
printlist(head);
}

```

Q.3 Find all the elements in the stack whose sum is equal to K (where K is given by the user).

Ans

```

#include <stdio.h>
void find (int arr[], int n, int s) {
    int sum = 0;
    int l = 0, h = 0;
    for (l = 0; l < n; l++) {
        while (sum < s && h < n)
            sum += arr[h];
        h++;
        if (sum == s)
        {
            printf("found");
            return;
        }
        sum -= arr[l];
    }
}

int main (void) {
    int arr[] = {2, 6, 0, 9, 7, 3};
    int s = 15;
    int n = size of (arr) / size of (arr[0]);
    find (arr, n, s);
    return 0;
}

```

Q4 Write a program to print the elements in a queue.

(i) in reverse order (ii) in alternate order

Ans:

```
#include <stdio.h>
#include <stdlib.h>
struct node
{
    int data;
    struct node *next;
}

void printrev(struct node *head)
{
    if (head == NULL)
        return;
    printrev(head->next);
    printf("%d", head->data);
}

void push(struct node * headrev, char new)
{
    struct node * node_new = (struct node *) malloc
        (sizeof(struct node));

    node_new->data = new;
    node_new->next = (head->ref);
    (*head-ref) = node_new;
}

int main()
{
    struct node *head = NULL;
    push(&head, 4);
    push(&head, 3);
    push(&head, 2);
    printrev(head); print alternate(head);
    return 0;
}
```

Void print alternate (Struct node* head)

```
{  
  int Count = 0;  
  while (head != NULL)  
  {  
    if (Count % 2 == 0)  
      Count << head->data << " ";  
    Count ++;  
    head = head->next;  
  }  
}
```


Q.5

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

Answer:-

Key differences between Array and Linked list

- 1) An array is a data structure that contains a collection of similar type data elements whereas the linked list is considered as non-primitive data structure. It contains a collection of unordered linked elements known as nodes.
- 2) In the ~~elements~~ array, the elements belong to indexes, i.e., if you want to get into the fourth element, you have to write the variable name with its index or location within the square bracket.
- 3) In a linked list, you have to start from the head and work your way through until you get to the fourth element.
- 4) Accessing an element in an array is fast, while in a linked list, it takes linear time, so it is quite a bit slower.
- 5) Operations like insertion and deletion in an array consume a lot of time. On the other hand, the performance of these operations in a linked list is fast.
- 6) In an array, memory is assigned during compile time, while in a linked list, it is allocated during execution of run-time.

Q.5 (ii) #include <stdio.h>
#include <stdlib.h>
int len(int a[])

{ int i=0, an=0;

while(1)

{

if(a[i])

{

an++, i++;

}

else

{

break;

}

}

return an;

}

Void changinglist (inta[], int b[])

{

for (int i=len(a)-1; i>=0; i--)

{

a[i+1] = a[i];

}

```
a[0] = b[0];
```

```
printf ("|n the elements of first array :|n");
```

```
for (int i=0; i<len(a); i++)
```

```
{  
    printf ("%d", a[i]);
```

```
}
```

```
for (int i=0; i<len(b); i++)
```

```
{  
    b[i] = b[i+1]; }
```

```
printf ("|n the elements of second array :|n");
```

```
for (int i=0; i<len(b); i++)
```

```
{  
    printf ("%d", b[i]);
```

```
}
```

```
}
```

```
int main()
```

```
{
```

```
    int a[10] = {1,2,3}, b[10] = {4,5,6};
```

```
    changinglist (a,b);
```

```
}
```