

Question:

5) WAP to Implement Singly Linked List with following operations

a) Create a linked list.

b) Deletion of first element, specified element and last element in the list.

Display the contents of the linked list.

Code:

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

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

```
typedef struct Node {  
    int data;  
    struct Node *next;  
}Node;
```

```
void InsertAtBeginning( Node **head_ref,int new_data);
```

```
void DeleteAtBeginning( Node **head_ref);
```

```
void DeleteAtEnd( Node **head_ref);
```

```
void Delete( Node **prev_node,int pos);
```

```
void PrintList(Node * next);
```

```
void InsertAtBeginning( Node **head_ref,int new_data)
```

```
{  
    Node *new_node=(struct Node*)malloc(sizeof( Node));  
    new_node->data=new_data;  
    new_node->next=*head_ref;  
    *head_ref=new_node;  
}
```

```
void DeleteAtBeginning( Node **head_ref)
```

```
{  
    Node *ptr;  
    if(head_ref == NULL)  
    {  
        printf("\nList is empty");  
    }  
    else  
    {  
        ptr = *head_ref;  
        *head_ref = ptr->next;  
        free(ptr);  
        printf("\n Node deleted from the beginning ...");  
    }  
}
```

```
}
```

```
void DeleteAtEnd(Node **head_ref)
```

```
{
```

```
    Node *ptr,*ptr1;
```

```
    if(*head_ref == NULL)
```

```
{
```

```
    printf("\nlist is empty");
```

```
}
```

```
    else if((*head_ref)-> next == NULL)
```

```
{
```

```
    free(*head_ref);
```

```
    *head_ref= NULL;
```

```
    printf("\nOnly node of the list deleted ...");
```

```
}
```

```
    else
```

```
{
```

```
    ptr = *head_ref;
```

```
    while(ptr->next != NULL)
```

```
{
```

```
    ptr1 = ptr;
```

```
    ptr = ptr ->next;
```

```
}
```

```
    ptr1->next = NULL;
```

```

free(ptr);

printf("\n Deleted Node from the last ...");

}

}

void Delete(Node **head_ref, int pos)
{
    Node *temp = *head_ref, *prev;

    if (temp == NULL)
    {
        printf("\nList is empty");
        return;
    }

    if (pos == 1)
    {
        *head_ref = temp->next;
        free(temp);
        printf("\nDeleted node with position %d", pos);
        return;
    }

    for (int i = 0; temp != NULL && i < pos - 1; i++)
    {
        prev = temp;
        temp = temp->next;
    }

    if (temp == NULL)
    {
        printf("\nPosition out of range");
        return;
    }

    prev->next = temp->next;
    free(temp);
    printf("\nDeleted node with position %d", pos);
}

void PrintList(Node *node)
{
    while (node!=NULL)

```

```

    {
        printf("%d\n",node->data);
        node=node->next;
    }
}

```

```

int main()
{
    int ch,new,pos;
    Node* head=NULL;
    while(ch!=6)
    {
        printf("\nMenu\n");
        printf("1.Create a linked list\n");
        printf("2.Delete at beginning\n");
        printf("3.Delete at a specific position\n");
        printf("4.Delete at end\n");
        printf("5.Display linked list\n");
        printf("6.Exit\n");
        printf("Enter your choice\n");
        scanf("%d",&ch);
        switch(ch)
        {
            case 1:
            {
                printf("Enter the data you want to insert at beginning\n");
                scanf("%d",&new);
                InsertAtBeginning(&head,new);
                break;
            }
            case 2:
            {
                DeleteAtBeginning(&head);
                break;
            }
            case 3:
            {
                printf("Enter the position at which you want to delete \n");
                scanf("%d",&pos);
                Delete(&head,pos);
                break;
            }
            case 4:
            {

```

```
    DeleteAtEnd(&head);  
    break;  
}  
case 5:  
{  
    printf("Created linked list is:\n");  
    PrintList(head);  
    break;  
}  
case 6:  
{  
    return 0;  
    break;  
}  
default:  
{  
    printf("Invalid data!");  
    break;  
}  
}  
}  
return 0;  
}
```

Output:

```
Menu
1.Create a linked list
2.Delete at beginning
3.Delete at a specific position
4.Delete at end
5.Display linked list
6.Exit
Enter your choice
1
Enter the data you want to insert at beginning
1

Menu
1.Create a linked list
2.Delete at beginning
3.Delete at a specific position
4.Delete at end
5.Display linked list
6.Exit
Enter your choice
1
Enter the data you want to insert at beginning
2

Menu
1.Create a linked list
2.Delete at beginning
3.Delete at a specific position
4.Delete at end
5.Display linked list
6.Exit
Enter your choice
1
Enter the data you want to insert at beginning
3

Menu
1.Create a linked list
2.Delete at beginning
3.Delete at a specific position
4.Delete at end
5.Display linked list
6.Exit
Enter your choice
1
Enter the data you want to insert at beginning
4

Menu
1.Create a linked list
2.Delete at beginning
3.Delete at a specific position
4.Delete at end
5.Display linked list
6.Exit
Enter your choice
1
Enter the data you want to insert at beginning
5
```

```
Menu
1.Create a linked list
2.Delete at beginning
3.Delete at a specific position
4.Delete at end
5.Display linked list
6.Exit
Enter your choice
2

Node deleted from the beginning ...
Menu
1.Create a linked list
2.Delete at beginning
3.Delete at a specific position
4.Delete at end
5.Display linked list
6.Exit
Enter your choice
5
Created linked list is:
4
3
2
1

Menu
1.Create a linked list
2.Delete at beginning
3.Delete at a specific position
4.Delete at end
5.Display linked list
6.Exit
Enter your choice
3
Enter the position at which you want to delete
2

Deleted node with position 2
Menu
1.Create a linked list
2.Delete at beginning
3.Delete at a specific position
4.Delete at end
5.Display linked list
6.Exit
Enter your choice
5
Created linked list is:
4
2
1

Menu
1.Create a linked list
2.Delete at beginning
3.Delete at a specific position
4.Delete at end
5.Display linked list
6.Exit
Enter your choice
4
```

```
Deleted Node from the last ...
Menu
1.Create a linked list
2.Delete at beginning
3.Delete at a specific position
4.Delete at end
5.Display linked list
6.Exit
Enter your choice
5
Created linked list is:
4
2

Menu
1.Create a linked list
2.Delete at beginning
3.Delete at a specific position
4.Delete at end
5.Display linked list
6.Exit
Enter your choice
4

Deleted Node from the last ...
Menu
1.Create a linked list
2.Delete at beginning
3.Delete at a specific position
4.Delete at end
5.Display linked list
6.Exit
Enter your choice
4

Only node of the list deleted ...
Menu
1.Create a linked list
2.Delete at beginning
3.Delete at a specific position
4.Delete at end
5.Display linked list
6.Exit
Enter your choice
4

list is empty
```