National Institute of Technology Calicut
Department of Computer Science and Engineering
B. Tech. (CSE) –Third Semester

CS2092D: Programming Laboratory
Extra Questions
(Assign_02_part-B)

General Instructions

- Programs should be written in C language and compiled using C compiler in Linux platform.
- Invalid input should be detected and suitable error messages should be generated.
- Sample inputs are just indicative.
- The extra questions do not come under the purview of evaluation scheme.

Part – B : Structures, Array of Structures, Function pointer, Linked List operations

1. Given a singly linked list L of n nodes, write a program that moves the last node of L to front of L . Each node in the linked list has a data part that stores an integer value and a pointer that points to the next node of the list. Display the elements of the original list and the modified list.

Input	Enter the value of n:	7
	Enter the elements:	1, 2, 3, 4, 5, 6, 7.
Output	The elements of the original list:	1, 2, 3, 4, 5, 6, 7
	The elements of the modified list:	7, 1, 2, 3, 4, 5, 6

2. Given a doubly linked list L of n nodes, write a program that deletes all alternate nodes of L starting from the second node . Each node in the linked list has a *data* part that stores an integer value and two pointers *next* and *prev* (*next* and *prev* points to the next and previous nodes respectively). Display the elements of the original list and the modified list.

Input	Enter the value of n:	7
	Enter the elements:	1, 2, 3, 4, 5, 6, 7.
Output	The elements of the original list :	1, 2, 3, 4, 5, 6, 7
	The elements of the modified list :	1, 3, 5, 7
Input	Enter the value of n:	4
	Enter the elements:	1, 2, 3, 4
Output	The elements of the original list :	1, 2, 3, 4
	The elements of the modified list :	1, 3

3. Given two polynomials represented by two linked lists L and R respectively, write a program to add the two polynomials. Each node in the list contains two data fields, ***coeff*** and ***degree*** (which are integers) and a link (pointer) to the next node. Pointers named 'head1' and 'head2' are used to point to the first nodes of L and R respectively. The pointer field of last nodes of L and R is set to NULL. Display the two polynomials and their sum.

   Note: During addition of two polynomials, add the polynomial coefficients which have the same degree.

Input	Enter the terms of the first polynomial (coeff, degree):	5, 2 3, 1 2, 0
	Enter the terms of the second polynomial (coeff, degree):	6, 3 7, 2 2, 1 3, 0
Output	The first polynomial is:	$5x^2+3x^1+2x^0$
	The second polynomial is:	$6x^3+7x^2+2x^1+3x^0$
	The sum is:	$6x^3+12x^2+5x^1+5x^0$

4. Write a menu-driven program that performs insertion and deletion of nodes in a list of nodes. Each node has a data field and a link (pointer) to the next node. A pointer named 'head' is used to point to the first node in the list. The pointer field of last node is set to NULL. Your program must include the following functions:

   insert(L, element) – Creates a node with data field set to element, and inserts the node to the end of the list L.
   delete(L) – Returns the value of element in the starting node of the list L, and deletes the node from L, if the list is not empty, otherwise print 'EMPTY'.
   print(L) - Display all the elements of the nodes in list L in the order of their insertion from first to last if the list is not empty, otherwise print 'EMPTY'.

   Menu driven program should allows the user to perform following operation:
   (a) Insert an element in the Linked List (L).
   (b) Delete an element from the Linked List (L).
   (c) Print the elements of the Linked List (L).

   Sample Input Output
   (1) Insert an element in the Linked List (L).
   (2) Delete an element from the Linked List (L).
   (3) Print the elements of the Linked List (L).
   (4) Exit.

Input	Enter your choice	1
	Enter the number	1
Input	Enter your choice	1
	Enter the number	2
Input	Enter your choice	1
	Enter the number	3
Input	Enter your choice	3
Output		1, 2, 3
Input	Enter your choice	2
Output	The deleted element is	1
Input	Enter your choice	3
Output		2, 3
Input	Enter your choice	4

5. Write a menu-driven program which contains array of **function pointer**. In the array each **function pointer** pointing to some function. Assume **function pointer array** contains 3 **function pointer**, which points to **add(a,b), sub(a,b)** and **mul(a,b)** functions.
   add(a,b): Addition of two numbers.
   sub(a,b): Substraction of two numbers.
   mul(a,b): Multiplication of two numbers.

   Menu driven program should allows the user to perform following operation:
   (a) Addition of two numbers.
   (b) Substraction of two numbers.
   (c) Multiplication of two numbers.

   Samle Input Output
   (1) Addition of two numbers.
   (2) Substraction of two numbers.
   (3) Multiplication of two numbers.
   (4) Exit

Input	Enter your choice	1
	Enter the value of a and b	1
		2
Output		3
Input	Enter your choice	2
	Enter the value of a and b	2
		2
Output		4
Input	Enter your choice	3
	Enter the value of a and b	2
		3
Output		6
Input	Enter your choice	4

6. Write a program to create the menu of a library. Create a structure containing book information like accession number, name of author, book title and flag to know whether the book is issued or not.

Create a menu in which the following can be done.

1 - Display book information

2 - Add a new book

3 - Display all the books in the library of a particular author

4 - Display the number of books of a particular title

5 - Display the total number of books in the library

6 - Issue a book

(If we issue a book, then its number gets decreased by 1 and if we add a book, its number gets increased by 1)

Sample Input Output

1- Add a new book

2- Display book information

3- Display all the books in the library of a particular author

4- Display the number of books of a particular title

5-Display the total number of books in the library

6- Issue a book

7- Exit

INPUT: Select an operation from the menu listed above: 1

Enter details of book 1 Accession number: B001

Name of author: ABC

Book title: Digital system design

Issued: Not issued

INPUT: Select an operation from the menu listed above: 1

Enter details of book 2 Accession number: B002

Name of author: XYZ

Book title: Software engineering

Issued: Not issued

INPUT: Select an operation from the menu listed above: 1

Enter details of book 3
Accession number: B003
Name of author: PQR
Book title: Fundamentals of programming
Issued: Not issued

INPUT: Select an operation from the menu listed above: 2

Enter the title of book: Software engineering

Output
Accession number: B002
Name of author: XYZ
Issued: Not issued

INPUT: Select an operation from the menu listed above: 1

Enter details of book 3
Accession number: B004
Name of author: ABC
Book title: Computer architecture
Issued: Not issued

INPUT: Select an operation from the menu listed above: 3

Enter the name of author: ABC

Output
Accession number: B001
Name of author: ABC
Book title: Digital system design
Issued: Not issued

Accession number: B004
Name of author: ABC
Book title: Computer architecture
Issued: Not issued

INPUT: Select an operation from the menu listed above: 4
Enter title of book: Fundamentals of programming
Output 1

INPUT: Select an operation from the menu listed above: 5
Output 4

INPUT: Select an operation from the menu listed above: 6
Enter the accession number of book to be issuing: B001
Name of author: ABC
Book title: Digital system design

INPUT: Select an operation from the menu listed above: 4
Enter title of book: Digital system design
Output Number of books in thistitle is: 0