# DATA STRUCTURES LABORATORY

[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2015 -2016)
SEMESTER - III

| | | | |
|---|---|---|---|
| **Laboratory Code** | **15CSL38** | **IA Marks** | **20** |
| **Number of Lecture Hours/Week** | **01I + 02P** | **Exam Marks** | **80** |
| **Total Number of Lecture Hours** | **40** | **Exam Hours** | **03** |

**CREDITS - 02**

**Course objectives:**

This laboratory course enable students to get practical experience in design, develop, implement, analyze and evaluation/testing of

- Asymptotic performance of algorithms.
- Linear data structures and their applications such as Stacks, Queues and Lists
- Non-Linear Data Structures and their Applications such as Trees and Graphs
- Sorting and Searching Algorithms

**Descriptions (if any)**

**Implement all the experiments in C Language under Linux / Windows environment.**

**Laboratory Experiments:**

1. Design, Develop and Implement a menu driven Program in C for the following **Array** operations
   a. Creating an Array of **N** Integer Elements
   b. Display of Array Elements with Suitable Headings
   c. Inserting an Element (**ELEM**) at a given valid Position (**POS**)
   d. Deleting an Element at a given valid Position(**POS**)
   e. Exit.

   Support the program with functions for each of the above operations.

2. Design, Develop and Implement a Program in C for the following operationson **Strings**
   a. Read a main String (**STR**), a Pattern String (**PAT**) and a Replace String (**REP**)
   b. Perform Pattern Matching Operation: Find and Replace all occurrences of **PAT** in **STR** with **REP** if **PAT** exists in **STR.** Report suitable messages in case **PAT** does not exist in **STR**

   Support the program with functions for each of the above operations. Don't use Built-in functions.

3. Design, Develop and Implement a menu driven Program in C for the following operations on **STACK** of Integers (Array Implementation of Stack with maximum size **MAX**)
   a. ***Push*** an Element on to Stack
   b. ***Pop*** an Element from Stack
   c. Demonstrate how Stack can be used to check ***Palindrome***
   d. Demonstrate ***Overflow*** and ***Underflow*** situations on Stack

e. Display the status of Stack
f. Exit

Support the program with appropriate functions for each of the above operations

4. Design, Develop and Implement a Program in C for converting an Infix Expression to Postfix Expression. Program should support for both parenthesized and free parenthesized expressions with the operators: **+, -, *, /, %(Remainder), ^(Power)** and **alphanumeric** operands.

5. Design, Develop and Implement a Program in C for the following Stack Applications
   a. Evaluation of **Suffix expression** with single digit operands and operators: **+, -, *, /, %, ^**
   b. Solving **Tower of Hanoi** problem with **n** disks

6. Design, Develop and Implement a menu driven Program in C for the following operations on **Circular QUEUE** of Characters (Array Implementation of Queue with maximum size **MAX**)
   a. Insert an Element on to Circular QUEUE
   b. Delete an Element from Circular QUEUE
   c. Demonstrate ***Overflow*** and ***Underflow*** situations on Circular QUEUE
   d. Display the status of Circular QUEUE
   e. Exit

Support the program with appropriate functions for each of the above operations

**Continued:**

7. Design, Develop and Implement a menu driven Program in C for the following operations on **Singly Linked List (SLL)** of Student Data with the fields: ***USN, Name, Branch, Sem, PhNo***
   a. Create a **SLL** of **N** Students Data by using ***front insertion***.
   b. Display the status of **SLL** and count the number of nodes in it
   c. Perform Insertion / Deletion at End of **SLL**
   d. Perform Insertion / Deletion at Front of **SLL(Demonstration of stack)**
   e. Exit

8. Design, Develop and Implement a menu driven Program in C for the following operations on **Doubly Linked List (DLL)** of Employee Data with the fields: ***SSN, Name, Dept, Designation, Sal, PhNo***
   a. Create a **DLL** of **N** Employees Data by using ***end insertion***.
   b. Display the status of **DLL** and count the number of nodes in it
   c. Perform Insertion and Deletion at End of **DLL**
   d. Perform Insertion and Deletion at Front of **DLL**
   e. Demonstrate how this **DLL** can be used as **Double Ended Queue**
   f. Exit