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***CSL3401 Data Structures Lab***

**L-T-P-Cr: 0-0-3-1**

**Pre-requisites:** Basic knowledge of C/C++ Programming Language.

**Objectives:**

* To implement linear and non-linear data structures
* To implement the different operations of search trees
* To implement graph traversal algorithms
* To implement various searching and sorting algorithms

**Course Outcomes:**

At the end of the course, a student should have:

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| **Sl. No.** | **Outcome** | **Mapping to POs** |
|  | Become proficient in implementing basic data structures such as arrays and linked list. | PO2, PO1 |
|  | Learnt programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortest paths. | PO2, PO1 |
|  | Learnt programs to demonstrate the implementation of various operations on stack and queue | PO2, PO3 |
|  | understood how to use various searching and sorting algorithms. | PO2, PO3 |
|  | become eligible in implementing projects requiring the implementation of the above data structures. | PO1, PO3, PO7 |

**List of Programs**

1. Write a program to search an element in a 1-D array using Linear Search and Binary Search.
2. Write a program to find the maximum & minimum number from an array of size 10.
3. Write a program to insert an element and delete an element at specified positions in an array.
4. Write a program to input 10 numbers in an array and print the sum of only those whose tenth place digit is divisible by 5.
5. Write a program to add, subtract and multiply two 2\*2 matrices.
6. Write a program to input a matrix of 3\*3 order and print the sum of its diagonal elements from left to right and right to left.
7. Write a program to input a line of text and count the number of vowels, consonants, characters, words and spaces.
8. Write a program to create a singly linked list of integers. Add an integer and delete an integer from the list and display the contents on the screen.
9. Write a program to create a doubly linked list of integers. Add an integer and delete an integer from the list and display the contents on the screen.
10. Write a program to reverse only the first N elements of a linked list.
11. Write a program to implement stack using Array with PUSH, POP, and TRAVERSE operations.
12. Mini project allocation
13. Write a program to implement stack using Linked List.
14. Write a program to convert infix notation to postfix notation using stack.
15. Write a program to implement multiple stacks using a single array.
16. Write a program to implement expression tree using stack and its inorder, preorder, and postorder traversals.
17. Write a program to implement Queue data structure using array and linked list.
18. Write a program to insert, delete and display the Queue.
19. Write a program to implement Linear Search and Binary Search.
20. Write a program to implement Insertion sort and Quick sort.
21. Write a program to implement Sparse Matrix

Course instructor can add experiments to the above list and/or modify some of the experiments in the above list depending upon course contents covered and examples used in the corresponding theoretical course.