

2/4 B.Tech - FIRST SEMESTER

IT3L1

CLASSIC DATA STRUCTURES LAB**Credits: 2****Lab: 3 Periods/week****Internal assessment: 25 marks****Semester end examination: 50 marks****Objectives:**

- To implement recursive and non recursive functions.
- To implement stack, queue, linked list, tree and graph data structures.
- To arrange data using different sorting techniques.

Outcomes:

Students will be able to

- Learn elementary data structures such as stacks, queues, linked lists.
- Write programs to implement non linear data structures like trees and graphs.
- Identify the appropriate data structure for given problem
- Get practical knowledge on the application of data structures

Exercise 1

Write the programs for the following searching techniques:

Linear and Binary.

Exercise 2

Write the programs for the following sorting techniques:

Bubble, Insertion, Quick, and Merge

Exercise 3

- a) Implementation of stack operations using arrays.
- b) Implementation of queue operations using arrays.

Exercise 4

a) Railroad cars numbered are as 0,1,2,---,n-1. Each car is brought into the stack and removed at any time. For instance, if n=3, we could move 0, move 1, move 2 and then take the cars out, producing 2,1,0. Implement application for the given problem.

b) Consider a payment counter at which the customer pays for the items purchased. Every time a customer finished paying for their items, he/she leaves the queue from the front. Every time another customer enters the line to wait, they join the end of the line. Implement the application for this problem.

Exercise 5

Implementation of singly linked list

Exercise 6

Implementation of doubly linked list

Exercise 7

- a) Implement Exercise 4(a) using linked lists.
- b) Implement Exercise 4(b) using linked lists.

Exercise 8

a) A polynomial has the main fields as coefficient, exponent in linked list it will have one more field called link to point to next term in the polynomial. If there are n terms in the polynomial then n such nodes has to be created.

Exercise 9

Implementation of Binary Search Tree operations

Exercise 10

Implementation of Graph traversals

- I) BFS
- II) DFS

Reference Books:

1. Seymour Lipschutz, Data Structures, Schaum's Outlines Series, Tata McGraw-Hill.
2. Ellis Horowitz, Satraj Sahni and Susan Anderson-Freed, Fundamentals of Data Structures in C, W. H. Freeman and Company