

**Data Structures Laboratory
(Lab)**

Course Code	16CSL38	Credits	2
Course type	L3	CIE Marks	25
Hours/week: L-T-P	0 – 0 – 3	SEE Marks	25
Total Hours:	36	SEE Duration	3 Hours

Course learning objectives

1. Demonstrate the abstract properties of various data structures such as stacks, queues, lists, and trees.
2. Compare different implementations of data structures and to recognize the advantages and disadvantages of the different implementations.
3. Able to demonstrate features of different data structures such as Graphs, Linked List, Hash Table, Queues to solve real world problems.

Prerequisites: C programming Skills

List of experiments:

1. Consider a calculator that needs to perform checking the correctness of parenthesized arithmetic expression and convert the same to postfix expression for evaluation. Develop and execute a program in C using suitable data structures to perform the same and print both the expressions. The input expression consists of single character operands and the binary operators + (plus), - (minus), * (multiply) and / (divide).
2. A calculator needs to evaluate a postfix expression. Develop and execute a program in C using a suitable data structure to evaluate a valid postfix expression. Assume that the postfix expression is read as a single line consisting of non-negative single digit operands and binary arithmetic operators. The arithmetic operators are + (add), - (subtract), * (multiply) and / (divide).
3. Develop and execute a program in C using suitable data structures to implement baggage carousel at airport, where the carousel rotates circularly with a maximum capacity of 10 bags. Each passenger should pick up his/her baggage with token provided. Perform following operations:
 - a. Addition of new bag to carousel.
 - b. Picking of bag from the carousel.
 - c. Show carousel status.
4. Develop and execute a program in C using suitable data structures to simulate the working of a queue in banks using token system. Where each token is defined with the following structure {token_id, transaction_No, transaction_description }. Provide the following operations for the same:
 - a. Insert
 - b. Delete
 - c. Display.
5. Consider a super market scenario where sales manager wants to search for the customer details using a customer-id. Customer information like (custid, custname, & custphno) are stored as a structure, and custid will be used as hash key. Develop and execute a program in C using suitable data structures to implement the following operations:
 - a. Insertion of a new data entry.
 - b. Search for customer information using custid.
 - c. Display the records. (Demonstrate collision and its handling using linear probing method).

6. Consider an warehouse where the items have to arranged in an ascending order. Develop and execute a program in C using suitable data structures to implement ware house such that items can be traced easily.
7. Consider a polynomial evaluation in certain application. Develop and execute a program in C using suitable data structures to implement polynomial evaluation for certain value of X, read from the user.
8. Develop and execute a program in C using suitable data structures to create a binary tree for a expression. The tree traversals in some proper method should result in conversion of original expression into prefix, infix and postfix forms. Display the original expression along with the three different forms also.
9. In a Computer chess game, the player has to make the moves against the opponents. Develop and execute a program in C to evaluate the two important traversal strategies for graphs to generate the appropriate move sequence.
10. Develop and execute a program in C using suitable data structures to perform Searching a data item in an ordered list of items in both directions and implement the following operations:
 - a. Create a doubly linked list by adding each node at the start.
 - b. Insert a new node at the end of the list.
 - c. Display the content of a list.
 An integer number identifies a data item.

Books

1. Horowitz, Sahni, Anderson-Freed: Fundamentals of Data Structures in C, 2nd Edition, Universities Press, 2007
2. Yedidyah, Augenstein, Tannenbaum: Data Structures Using C and C++, 2nd Edition, Pearson Education, 2003.

Course Outcome (COs)

At the end of the course, the student will be able to

**Bloom's
Level**

- | | |
|---|-----------|
| 1. Demonstrate the understanding of structured programming. | L3 |
| 2. Analyze the problem statement and able to choose right data structure for implementation. | L4 |
| 3. Develop an ability to construct robust, maintainable programs which satisfy the requirements of user. | L3 |

Program Outcome of this course (POs)

PO No.

Engineering Graduates will be able to:

- | | |
|---|----------|
| 1. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. | 3 |
| 2. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. | 4 |
| 3. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the | 5 |

limitations.

4. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. 12

Assessment methods

1. Periodic journal evaluation
2. I.A Test
3. Viva Voce

Scheme of Continuous Internal Evaluation (CIE):

Components	Conduct of the lab	Journal submission	Total Marks
Maximum Marks: 25	10	15	25
<p>➤ Submission and certification of lab journal is compulsory to qualify for SEE.</p> <p>➤ Minimum marks required to qualify for SEE : 13 marks out of 25</p>			

Scheme of Semester End Examination (SEE):

Rules to be followed for SEE exams:

1. Students have to execute a program selected from a lot of all experiments.
2. The breakup of evaluation will be

SEE	Initial write up	10	50
	Conduct of experiments	20	
	Viva- voce **	20	

**** - Viva should be taken for individual students by the external examiners.**

3. Minimum passing criteria is : 40% SEE marks.
4. Change of experiment is allowed only once.

Practical examination (SEE) of 3 hours duration will be conducted for 50 marks. It will be reduced to 25 marks for the calculation of SGPA and CGPA.