

## Daffodil International University Department of Computer Science and Engineering Faculty of Science & Information Technology

Midterm Examination, Spring 2025

Course Code: CSE123, Course Title: Data Structures
Level:1 Term:2 Batch: ALL

Time: 1.5 Hours

Marks: 25

## Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1.	a) Explain the concept of a self-referential structure in O Provide an example.	C. 3	CO1
	b) Write necessary code using C language to implement	a 7	CO2
	Linear Linked List with the following operations:		
	reaconimulos of Stack and Quencio design	MPP II	
	1. Insert at End	8 8 8 6	
	2. Delete from Beginning	***	
	3. Display the List		
	Requirements:	sed again d 24	
	• Define node containing <i>data</i> (int) and a <i>pointer</i> (self referential).		
	<ul> <li>Use dynamic memory allocation (malloc and free) for node creation and deletion.</li> </ul>	е	
	<ul> <li>Provide reasoning for using a linked list in applications like data storage for Library.</li> </ul>		
	and the second of the second o		
	(Full correct implementation: 7 marks, Partial correctness: 4-5		
	marks, Minor issues: 2-3 marks)		
2.	a) Why is dynamic memory allocation preferred when	2	CO1
	implementing linked lists? Explain with an example.		
	b) Implement a Stack using a Linked List in C with the	8	CO2
	following operations:		
	1. Push (Insert an element)		
	2. Pop (Remove the top element)		
	3. Peek (View the top element)		
	4. isEmpty (Check if the stack is empty)		

	• Provide appropriate output for sample inputs.		
	(Full correct implementation: 8 marks, Partial correctness: 5-6 marks, Minor issues: 3-4 marks)	To and	
3.	Problem Solving (Analysis & Synthesis Level) Problem Scenario:	5	CO2
	A printer management system requires efficient handling of print jobs. Each print job has a priority value. The system should process:		
	<ul> <li>High-priority jobs immediately (Stack behavior: LIFO).</li> <li>Normal jobs in the order they were received (Queue</li> </ul>		
1433	behavior: FIFO).	a (c	
100	Task:	7 (d	
	1. Propose a combination of Stack and Queue to design this system.		
	<ol> <li>Draw a flowchart or diagram to represent the process.</li> <li>Explain how the system handles multiple job requests with varying priorities.</li> </ol>		
	(Solution approach: 3 marks, Diagram: 1 mark, Explanation: 1 mark)		

Good Luck