



# Daffodil International University

## Department of Software Engineering

Faculty of Science & Information Technology

Final Examination, Spring 2024

Course Code: SE 131, Course Title: Data Structure

Level: 1 Term: 3 Section: A, B, C, D, E, F, G, H, I

Instructor: AB-A,B,E, RMS-C,D, MHS-F, SI-G,H,I

Modality: Close Book Exam

Date: Thursday 2 June 2024

Time: 12:00 PM – 02:0 PM

Two hours (2:00)

Marks: 40

### Directions:

- Students need to go through the CASE STUDY shown in this exam paper.
- Analyze and answer specific sections based on your own thinking and work.

- Answer all the questions, sequentially

1. Suppose you have some elements to construct a Binary Search Tree. The elements are:

[CLO- 4, Level-3] [Marks-10]

51, 53, 60, 45, 70, 54, 32, 46, 21, 11, 18, 22, 74, 63, 91

- a. Sketch the BST
- b. Delete 50 from the tree, as you have drawn from question no 'a', Sketch the BST
- c. Insert 70 from the tree, as you have drawn from question no 'a', Sketch the BST
- d. Deploy traversing in the BST: Perform in-order and post-order traversals of the BST obtained in part
- e. Map the types of trees: For each of the given examples, identify the type of tree (e.g., full tree, complete tree, balanced tree) and explain your reasoning:

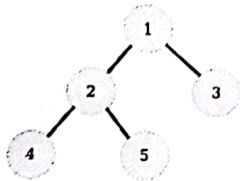


Fig-I

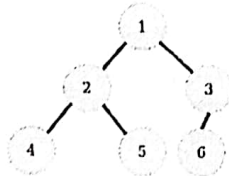


Fig-II

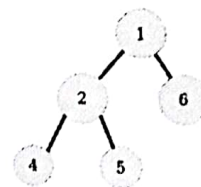
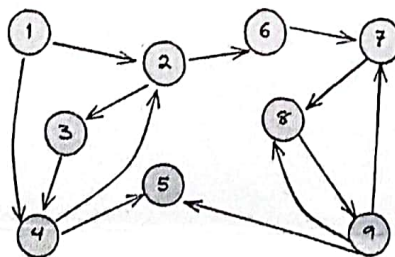


Fig-III

2. Suppose you have a graph as follows:

[CLO- 4, Level-3] [Marks-10]



Now:

- a. From Array of Linked list, which one is suitable to represent graph in a computer program. Express why this data structure is the best choice for representing the graph.
- b. Show the adjacency matrix representation of the given Graph
- c. Show the adjacency List representation of the given Graph
- d. Illustrate the Weighted graph and Complete Graph.

3. a. Draw the operation for circular/advance Queue, where maximum capacity of a queue is 5 memory locations. Now **show** one after another operation as given below:

- |                                     |                               |
|-------------------------------------|-------------------------------|
| i. Initially 10, 20 and 30 inserted | vi. Insert 11, 22, 33, 44, 55 |
| ii. Delete three elements           | vii. Insert 66                |
| iii. Insert 40, 50, 60              | viii. Delete 5 elements       |
| iv. Delete 2 ITEMS                  | ix. Delete 1 Item             |

- b. Illustrate the Priority Queue with an example.

[CLO- 3, Level-3] [Marks-5]

4. Suppose you have to store "T", "N", "A", "Y", "A" inside a linked list. Assume the following 7 memory cells are available for the linked list:

1000	1001	1002	1003	1004	1005	1006
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[CLO- 3, Level-3] [Total Marks-15]

- Construct a double-way linked list using the available memory cells and store data elements in the list following the above instructions, and **sketch** the available linked lists.
- After constructing the double-way linked list, as done in part 'a', insert "I" as the 6th element and "B" as the last element of the list, and **sketch** the resulting linked list.
- Following the creation of the double-way linked list in part 'b', delete all the "A"s from the linked list if exist, and **sketch** the resulting list.
- Construct a circular linked list with flag using the available memory cells for the given data in the question and **sketch** the resulting list.
- After constructing the circular linked list in question number 'd', insert "N" as the 1st element into the list, "P" as the last element and **sketch** the resulting linked list.
- Following the insertion in question number 'e', delete "B" from the list if it exists, and if it exists multiple times, then delete the first occurrence, and **sketch** the resulting list.
- Construct** a circular linked list with a sentinel value using the available memory cells and store the given elements, and **sketch** the available linked lists.
- After constructing the circular linked list with a sentinel value in part 'g', delete the first occurrence of "A" from the linked list if it exists, and **sketch** the resulting list.
- Following the insertion in part 'h', insert "H", "I", "M", and "G" as the last four elements into the circular linked list with a sentinel value, and **sketch** the resulting list.
- Prepare** the basic part of the code for linked list construction and print. [Marks Distribution 10\*1.5]