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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

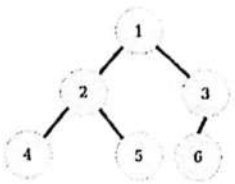


Fig-II

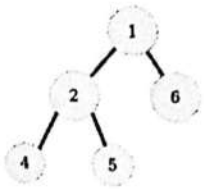
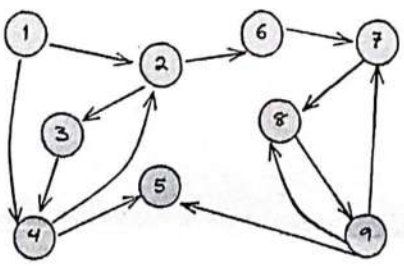


Fig-III

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.

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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
ii. Delete three elements
iii. Insert 40, 50, 60
iv. Delete 2 ITEMs
v. Insert 11, 22, 33, 44, 55
vi. Insert 66
vii. Delete 5 elements
viii. Delete 1 Item

b. **Illustrate** the Priority Queue with an example.

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

4. Suppose you have to store "I", "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

[CLO- 3, Level-3] [Total Marks-15]

a) 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.
b) 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.
c) 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.
d) Construct a circular linked list with flag using the available memory cells for the given data in the question and **sketch** the resulting list.
e) 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.
f) 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.
g) **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.
h) 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.
i) 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.
j) **Prepare** the basic part of the code for linked list construction and print. **[Marks Distribution 10*1.5]**

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