Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering

End Sem Examination Dec-2023

EC3ET04 Data Structure

Programme: B.Tech. Branch/Specialisation: EC

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

Q.1 i. Which linked list stores the two pointer nodes store null values? **1**

(a) Single linked list (b) Doubly linked list

(c) Circular linked list (d) Hashed list

ii. Which type of linked list stores the address of the header node in the next field of the last node? **1**

(a) Single linked list (b) Doubly linked list

(c) Circular linked list (d) Hashed list

iii. The number of edges from the root to the node is called _____ of the tree. **1**

(a) Height (b) Depth (c) Length (d) Width

iv. In a full binary tree if number of internal nodes is I, then number of nodes N are? **1**

(a) N = 2 * I (b) N = I + 1 (c) N = I – 1 (d) N=2 * I + 1

v. What is the speciality about the in-order traversal of a binary search tree? **1**

(a) It traverses in a non-increasing order

(b) It traverses in an increasing order

(c) It traverses in a random fashion

(d) It traverses based on priority of the node

vi. What is an AVL tree? **1**

(a) A tree which is balanced and is a height balanced tree

(b) A tree which is unbalanced and is a height balanced tree

(c) A tree with three children

(d) A tree with almost 3 children

P.T.O.

vii. What is the advantage of bubble sort over other sorting techniques? **1**
(a) It is faster
(b) Consumes less memory
(c) Detects whether the input is already sorted
(d) Can sort large number of items

viii. What is an external sorting algorithm? **1**
(a) Algorithm that uses tape or disk during the sort
(b) Algorithm that uses main memory during the sort
(c) Algorithm that involves swapping
(d) Algorithm that are considered 'in place'

ix. The searching technique that takes O (1) time to find a data is- **1**
(a) Binary search (b) Linear search
(c) Hashing (d) Tree search

x. In extended binary tree Internal nodes are represented by- **1**
(a) Circle (b) Square (c) Triangle (d) Hexagon

Q.2 i. Write a short note on applications of an array. **2**

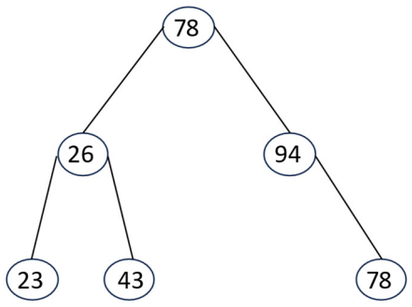
ii. Explain push and pop operations performed with a stack. **3**

iii. Write an algorithm for insertion after a specified element in a sorted single linked list. **5**

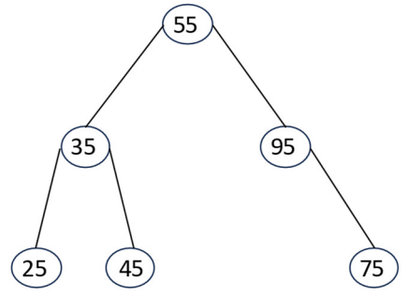
OR iv. Write an algorithm to delete the given element in a doubly linked list. **5**

Q.3 i. What is a tree in data structure? Write short note on representation of a binary tree. **3**

ii. Traverse the following tree in pre-order using non-recursive traversal. **7**



OR iii. Traverse the following tree in pre-order using non-recursive traversal. **7**



Q.4 i. What is a binary search tree? Write its applications. **3**

ii. What is an AVL tree and how its nodes are represented? Construct an AVL tree for the following list: **7**
23, 12, 82, 15, 10, 57.

OR iii. Explain B-tree with an example. Construct the B-tree of order 4 for the following elements: **7**
1, 6, 8, 2, 9, 12, 15, 7, 18, 3, 4, 20.

Q.5 i. Write any two differences between internal and external sorting. **2**

ii. Explain insertion sort. What is best case and worst-case complexity of insertion sort? Sort the following list A using insertion sort. **8**
A = [5, 12, 2, 25, 9, 65, 8, 34]

OR iii. What do you mean by max heap, min heap and root of a heap? Construct a max heap for the following list of elements: **8**
40, 56, 28, 79, 20, 18, 67 and 58.

Q.6 Attempt any two:

i. Explain binary search with the help of an example. **5**

ii. What is hashing? Explain any one method for collision resolution. **5**

iii. Write short note on applications of searching and indexing in computer field. **5**

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