(T) Roll No. .....

PAPER ID—16014

B.Tech. EXAMINATION, 2025

(Third Semester)

ADVANCED DATA STRUCTURE

Btech-2023-461

Time : 3 *Hours* *Maximum Marks :* 70

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. **1** is compulsory. Each question carries equal marks.

(Compulsory Question)

1. (a) Define Abstract Data Type. Give any *two* examples.

   (b) Compare between linear linked list and circular linked list.

   (c) Differentiate AVL tree and Binary search tree.

   (d) Explain the process of deleting an element from a 2-3 tree, especially when the deletion violates a tree property.

   (e) Describe the various ways of organizing records in a file.

   (f) When is an adjacency matrix more suitable than an adjacency list ?

   (g) What is a flow network ? Define its key components : nodes (vertices), edges (links), capacities, source and sink.

7×2=14

Unit I

2. (a) Explain about the implementation of stack operations using linked lists. **7**

   (b) Discuss the common collision resolution strategies used in closed hashing system. **7**

3. (a) What do you mean by collision and how can you handle it by using linear probing ? **7**

(b) Explain the insertion operation in linked list. How nodes are inserted after a specified node ? 7

Unit II

4. (a) What do you mean by a balance factor in AVL tree and explain about LL and RR rotations with an example. 7

(b) Explain Splay-trees with neat diagram. 7

5. (a) Create a binary tree from the following in-order and pre-order traversal data : 7

In-order Traversal Data	Pre-order Traversal Data
g	*a*
d	*b*
h	*d*
b	*g*
e	*h*
i	*e*
a	*i*
f	*c*
j	*f*
c	*j*

(b) Explain the issues with AVL Tree and recommend how can Red Black Trees be a solution for it. 7

Unit III

6. (a) Prove that :

$$(A - B) \cap (B - A) = (A \cup B) - (A \cap B)$$

(b) What is sequential file organization ? Discuss the advantages and disadvantages of sequential file organization. 7

7. (a) Write the contrapositive, converse and inverse of the conditional statement, "The Indian Cricket wins when Sachin Tendulkar Scores 100". 7

(b) Discuss the case study where Indexed Sequential Organization is useful. 7

Unit IV

8. (a) Prove that the number of edges in a complete graph of n vertices in $n(n-1)/2$. 7

(b) Develop an algorithm to compute the shortest path using Dijkstra's algorithm. Validate the algorithm with suitable example. 7

9. (a) Examine topological sorting of a graph G with suitable example. 7

(b) Explain with algorithm, how DFS be performed on an undirected graph. 7

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