

**R22**

Code No: 183AM

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech II Year I Semester Examinations, December – 2024/January - 2025

**DATA STRUCTURES**

(Common to CSE, IT, CSIT, CE(SE), CSE(CS), CSE(DS), CSD)

**Time: 3 Hours**

**Max. Marks: 60**

**Note:** This question paper contains two parts A and B.

i) **Part - A** for 10 marks, ii) **Part - B** for 50 marks.

- Part-A is a compulsory question which consists of ten sub-questions from all units carrying equal marks.
- Part-B consists of **ten questions** (numbered from 2 to 11) **carrying 10 marks each**. From each unit, there are two questions and the student should answer one of them. Hence, the student should answer five questions from Part-B.

**PART – A**

**(10 Marks)**

- 1.a) How can stacks be used in the implementation of function calls. [1]
- b) Write stack application. [1]
- c) What is the role of levels in a skip list? [1]
- d) What is rehashing, and when is it performed in a hash table? [1]
- e) What is the purpose of double rotations in an AVL Tree? [1]
- f) What happens when a key to be inserted already exists in a Binary Search Tree? [1]
- g) What data structure is commonly used to implement a depth-first search (DFS)? [1]
- h) What is pivot element in Quick sort? [1]
- i) What is Trie? [1]
- j) In the Boyer-Moore algorithm, what is the role of the good suffix rule? [1]

**PART – B**

**(50 Marks)**

- 2.a) Discuss the role of ADTs in algorithm design.
- b) How does searching for an element in a singly linked list differ from searching in an array? Explain. [5+5]

**OR**

- 3.a) Explain why the FIFO principle is important in the context of real-world applications.
  - b) Write a program to insert a new node in the middle of a singly linked list. [5+5]
- 4.a) Write an algorithm to delete an element from a skip list.
  - b) What are the advantages and disadvantages of extendable hashing? [5+5]

QA QA QA QA QA QA QA G

**OR**

5.a) Explain how quadratic probing works, and why does it help reduce clustering compared to linear probing? [5+5]  
b) Insert the following list of elements in to the hash table ( size of hash table is 10 ) by using Linear Probing 56, 78,10, 46, 27, 18, 30. [5+5]

6.a) In a Red-Black Tree, what are the various cases that may require rotations after an insertion or deletion, and how are these handled?

b) Write an algorithm to delete an element from a binary search tree. [5+5]

**OR**

7.a) Insert the following list of elements into Splay tree 34,67,12,40,53,78,15,48,90.

b) Explain the operations of AVL tree with an example. [5+5]

8.a) Explain about the BFS with an example.

b) Write an algorithm of Heap Sort. [5+5]

**OR**

9.a) Distinguish between Adjacency List and Adjacency Matrix with an example.

b) Explain the basic model for external sorting. [5+5]

10.a) Explain the operations of Standard Trie with an example.

b) Write an algorithm of Brute Force. [5+5]

**OR**

11.a) Consider the following text T and pattern P,

T = DSJKFHKSJHFIFHF and

P = SJHFIF

Apply the Boyer – Moore algorithm and illustrate the intermediate steps.

b) Write insertion algorithm of compressed trie. [5+5]

QA QA QA QA QA QA QA G

QA QA QA QA QA QA QA G

QA QA QA QA QA QA QA G