Code No: 183AM **R22**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech II Year I Semester Examinations, December – 2024/January - 2025
DATA STRUCTURES
(Common to CSE(AI&ML), CSE(IOT), AI&DS, AI&ML)

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 is a stack used in balancing parentheses in an expression?	[1]
b)	How would you handle an empty list while performing insertion or deletion?	[1]
c)	How does double hashing minimize clustering in a hash table?	[1]
d)	How does a skip list improve the performance of search operations?	[1]
e)	What is the maximum number of children a node can have in a B-Tree of order m?	[1]
f)	Why are B+ Trees preferred in databases for indexing?	[1]
g)	What is the primary data structure used in Heap Sort?	[1]
h)	What is external sorting?	[1]
i)	What is the "bad character heuristic" in the Boyer-Moore algorithm?	[1]
j)	What are the primary operations supported by a trie?	[1]

PART-B

(50 Marks)

2.a) Write an algorithm for inserting an element at a specific position in a singly linked list.
b) Discuss the use of stacks in parsing and syntax analysis in compilers. [5+5]

OR

3.a) How memory is managed in stack operations when implemented with arrays versus linked lists? Explain.
b) Write a program to Implement the Dequeue operation for a queue using an array. [5+5]

4.a) Compare the time complexity of operations (insertion, deletion, and search) in a skip list versus a linear list.
b) Explain the separate chaining method of collision resolution. How are collisions handled in this approach? [5+5]

OR

5.a) What are the advantages and disadvantages of using a linear list to represent a dictionary?
b) Explain in detail about extensible hashing with example. [5+5]

6.a) Explain how deletion works in a Red-Black tree. How does the tree maintain its balance after a Deletion explain with an example?

b) Construct the Splay tree of the list of elements
14, 78, 34, 12, 67, 89, 36, 20, 80. [5+5]

OR

7.a) Write a function for single rotation and double rotation of an AVL tree.

b) Compare B-trees and B+ trees in terms of their structure and use cases. Which one is more efficient for database indexing, and why? [5+5]

8.a) Explain the strategies to improve the performance of Quick Sort and avoid its worst-case time complexity?

b) Sort the following list of elements by using Heap sort
32, 45, 78, 12, 37, 10, 99, 5, 16. [5+5]

OR

9.a) Explain in detail about Heap sort with neat example.

b) Explain about DFS with suitable example. [5+5]

10.a) How does the KMP algorithm avoid unnecessary re-checking of characters?

b) Differentiate between Standard trie and compressed trie. [5+5]

OR

11.a) Explain the construction of a suffix trie from a given string.

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

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