Code No: 157EK **R18**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year I Semester Examinations, February - 2025

DATA STRUCTURES

(Electrical and Electronics Engineering)

Time: 3 Hours **Max.Marks:75**

Note: i) Question paper consists of Part A, Part B.

ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.

iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a)	What are the characteristics of a good data structure?	[2]
b)	What is the circular queue, and how does it improve upon the regular queue representation?	[3]
c)	What are the properties of a good hash function?	[2]
d)	Write the advantages of using a skip list over a linear list for dictionary operations.	[3]
e)	What is the importance of Red-Black tree	[2]
f)	Write an algorithm of rotations of an AVL tree	[3]
g)	What are the applications of depth-first search (DFS) in real-world problems?	[2]
h)	Compare the adjacency matrix and adjacency list representations in terms of space complexity and performance.	[3]
i)	What is the role of a terminal (or end) character in a Trie	[2]
j)	What are the preprocessing steps in the KMP algorithm?	[3]

PART – B

(50 Marks)

2.a)	Write a program to convert an expression from infix to postfix	
b)	How do we search for a value in a singly linked list? Explain with an algorithm.	[5+5]
	OR	
3.a)	Write a program to implement the Dequeue operation for a queue using an array.	
b)	Describe the process of handling stack overflow and underflow conditions.	[5+5]
4.a)	What is the concept of separate chaining in collision resolution? How is it implemented in hash tables?	
b)	Write a function to Search an element in a Skip list.	[5+5]
	OR	
5.a)	Explain the concept of a skip list and how it can be used to represent a dictionary.	
b)	Insert the following list of elements in to the hash table (size of hash table is 10) by using double hashing 55, 49, 10, 35, 17, 30, 22, 16.	[5+5]

6.a) Construct the Splay tree of the following list of elements
34, 56, 12, 40, 88, 67, 15, 36, 90

b) Write an algorithm to delete an element from Binary Search tree. [5+5]

OR

7.a) How does the Red-Black Tree ensure that the tree remains balanced after multiple insertions and deletions?

b) Write an algorithm to insert an element in an AVL tree. [5+5]

8.a) How is external sorting different from internal sorting in terms of memory usage?

b) Explain the Breadth-First Search (BFS) algorithm. What is its time complexity? [5+5]

OR

9.a) Write an algorithm of Merge sort and explain the main logic.

b) Sort the following list of elements by using heap sort
34, 57, 90, 12, 5, 43, 25, 98, 10 [5+5]

10.a) Discuss the concept of "bad character rule" and "good suffix rule" in the Boyer-Moore algorithm.

b) How does the insertion process work in a Trie? [5+5]

OR

11.a) Write an algorithm of Brute Force pattern matching

b) Explain how a standard Trie is constructed and how it is used for searching patterns in strings. [5+5]

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