CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
I–B.TECH–II–Semester End Examinations (Supply) - January- 2025
DATA STRUCTURES
(Common for ECE, CSE, IT)

[Time: 3 Hours]   [Max. Marks: 60]

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 10 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A   (10 Marks)

1. a) Define data structure.   [1M]
   b) Implement an algorithm to delete for an element in a singly linked list.   [1M]
   c) List various applications of dictionaries   [1M]
   d) Identify the properties of a hash function   [1M]
   e) What are the operations used in AVL trees?   [1M]
   f) What are properties of Red-Black tree?   [1M]
   g) What data structure is commonly used to implement graphs?   [1M]
   h) Which sorting algorithm uses a heap data structure to sort elements?   [1M]
   i) What is the main principle behind the Boyer-Moore algorithm that improves its efficiency over other algorithms?   [1M]
   j) What is the time complexity of the Brute Force algorithm for pattern matching?   [1M]

PART-B   (50 Marks)

2. Define stack. Discuss about the various representations of a stack. Explain different operations that can be performed on stack.   [10M]

OR

3. Identify and execute various operations that can be performed on a queue.   [10M]

4. Utilize linear probing to insert pairs whose keys in order are 7, 42, 25, 70, 14, 38, 8, 21, 34, 11 into a hash table with b = 13 buckets using the hash function f(k) = k mod b. start with an empty hash table and draw the hash table following each insert?   [10M]

OR

5. Explain the following   [10M]
   i) Rehashing   ii) Extendible hashing.

6. Apply the insertion algorithm to add nodes to a binary search tree (BST) for the keys 10, 5, 15, 3, and 7.   [10M]

OR

7. Build a B-tree of order 3 for the keys 7, 3, 18, 10, 12, and 15, showing the resulting structure.   [10M]

8. Explain Quick Sort algorithms with example.   [10M]

OR

9. Describe the adjacency list representation of a graph. How does it differ from an adjacency matrix.   [10M]

10. Write the difference between Boyer-Moore algorithm and Knuth-Morris-Pratt (KMP) algorithm.   [10M]

OR

11. Write the difference between Standard Trie and Compressed Trie.   [10M]

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