

Code No: 157EK

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year I Semester Examinations, January/February - 2023

DATA STRUCTURES
(Common to CE, ME, ECE)

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) Write down the applications of stack. [2]
- b) What are the advantages and disadvantages of the linked list implementation? [3]
- c) What is double hashing? [2]
- d) Write operations on dictionaries. [3]
- e) List the properties of binary search tree. [2]
- f) Write the properties of Splay Tree. [3]
- g) List out the applications of BFS. [2]
- h) Give the heap sort algorithm. Write the complexity of your algorithm. [3]
- i) Define Trie? What are the properties of Tries? [2]
- j) Give the importance preprocessing for Good suffix heuristic. [3]

PART – B**(50 Marks)**

- 2.a) What is the complexity of finding maximum and minimum value from an array of n values? Explain the steps of deriving complexity.
- b) Distinguish between the stack and the queue data structures. [5+5]

OR

- 3.a) Write an algorithm/pseudocode to count the number of nodes in a Singly Linked List?
 - b) Assume that a stack is represented using linked list. Write down the algorithms for the following operations:- (i) Push (ii) Pop. [5+5]
- 4.a) What are the properties of a good hash function? With necessary examples explain four different hashing techniques.
 - b) Explain the implementation of skip list representation with an example. [5+5]

OR

- 5.a) Given input keys {1, 3, 23, 9, 4, 29, 19} and a hash function $h(X) = X \text{ mod table size}$. The initial hash table contains 10 slots, with starting index 0. Show the resulting table after rehashing when the load factor= 0.5, using linear probing.
- b) Explain the implementation of deletion of new node in dictionary with an example.[5+5]

- 6.a) Give an algorithm to perform binary search. Using the algorithm, search for elements 23 and 47 in the given set of elements [12 23 27 35 39 42 50].
- b) Construct a B-Tree with order $m=3$ for the key values 2, 3, 7, 9, 5, 6, 4, 8, and 1 delete the values 4 and 6. Show the tree in performing all operations. [5+5]

OR

- 7.a) What is a Red-Black Tree? Mention the properties that a Red-Black tree holds.
- b) Show the results of inserting 43, 11, 69, 72, and 30 into an initially empty AVL tree. Show the results deleting of the node 11 and 72 one after the other from constructed AVL Tree. [4+6]

- 8.a) Give algorithm for DFS and demonstrate DFS using suitable example.
- b) Write an algorithm/ C program to perform merge sort. [5+5]

OR

- 9.a) Demonstrate the implementation to do the partition of a list using quick sort and then use insertion sort for sorting sub lists.
- b) Write an algorithm/pseudocode to sort elements using Heap sort technique? Illustrate the working of Heap sort algorithm on the following input: 35, 15, 0, 1, 60. [5+5]

- 10.a) Demonstrate running time analysis of Brute Force String Matching Algorithm using suitable example.
- b) Discuss in detail about Bad Character Heuristic using suitable example. [5+5]

OR

- 11.a) List and demonstrate types of tries with an example.
- b) Explain about the Boyer- Moore algorithm. [5+5]

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