

Code: 19CS4501A

**III B.Tech - I Semester – Regular Examinations – JANUARY 2022****ADVANCED DATA STRUCTURES  
(COMPUTER SCIENCE & ENGINEERING)**

Duration: 3 hours

Max. Marks: 70

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- Note: 1. This question paper contains two Parts A and B.  
2. Part-A contains 5 short answer questions. Each Question carries 2 Marks.  
3. Part-B contains 5 essay questions with an internal choice from each unit. Each question carries 12 marks.  
4. All parts of Question paper must be answered in one place
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**PART – A**

1. a) How does union-find works.
- b) Define the balance factor of a node in a binary tree.
- c) In a binary heap, for an item in position  $i$  where are the parent, left child, and right child located?
- d) Find the number of edges in a spanning tree of graph with  $n$ -vertices?
- e) Define the word Multi-way trie with an example.

**PART – B****UNIT – I**

2. a) What is the expected number of probes for both successful and unsuccessful searches in a linear probing table with load factor 0.25? 6 M
- b) Explain how Insertion, Deletion & Search is done in skip lists with example. 6 M

OR

3. a) Given the input (4371, 1323, 6173, 4199, 4344, 9679, 19891), a fixed table size of 10, and a hash function  $H(X) = X \bmod 10$ , show the resulting quadratic probing hash table. 6 M
- b) Outline Double Hashing with an example. 6 M

### UNIT – II

4. a) How to calculate the Height of an AVL tree. 6 M
- b) Show the result of inserting 2, 1, 4, 5, 9, 3, 6, and 7 into an initially empty AVL tree. 6 M

OR

5. a) Construct the 2-3 Trees for following Elements 4, 3, 9, 10, 1, 6, 7, 8, 5, 2. 6 M
- b) Discuss the importance of LL, RR Rotations in an AVL tree with an example. 6 M

### UNIT-III

6. a) Describe the structure and ordering properties of the binary heap. 6 M
- b) Show the result of inserting 10, 12, 1, 14, 6, 5, 8, 15, 3, 9, 7, 4, 11, 13, and 2, one at a time, in an initially empty heap then convert it into min heap. 6 M

OR

7. a) Write an algorithm to perform Insertion operation in Binomial Queue. 6 M
- b) Illustrate the Min, Max heaps with examples. 6 M

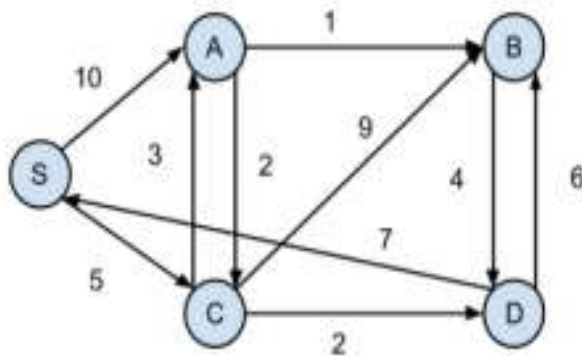
## UNIT – IV

8. a) Write the procedure to find the shortest paths from the source node to another node of a graph using Dijkstra's Algorithm. 6 M

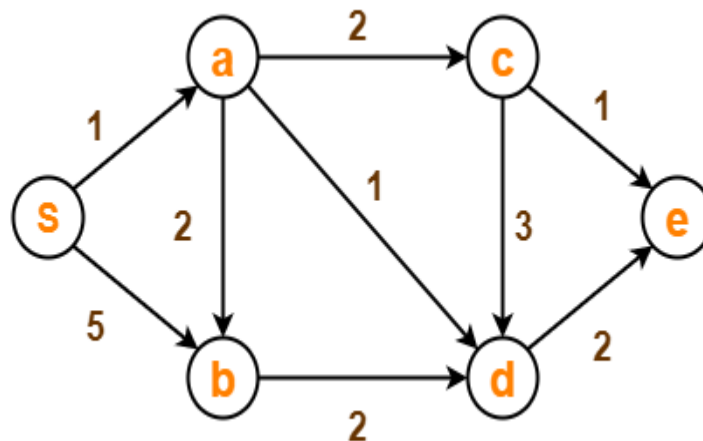
b) Explain the procedure to find the cost of a minimal spanning tree with Prim's Algorithm. 6 M

OR

9. a) Determine the lengths of shortest paths from the vertex  $s$  to all other vertices of the following graph using Kruskal's Algorithm. 6 M



b) Solve the following all pairs shortest path problem. 6 M



## UNIT – V

10. a) Solve the Boyer-Moore algorithm for the following Example:

Text: ABCABCDABABCDABCDABDE

Pattern: ABCDABD

6 M

- b) Solve the Knuth Morris-Pratt algorithm for the following Example:

Text: HEREISASIMPLEEXAMPLE

Pattern: EXAMPLE

6 M

OR

11. a) What is Digital search tree. Explain the procedure to insert & delete from a Digital search tree.

6 M

- b) Describe the differences between Boyer- Moore algorithm and Knuth Morris-Pratt algorithm.

6 M