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Reg. No:

20841A1299

VELAGAPUDI RAMAKRISHNA

SIDDHARTHA ENGINEERING COLLEGE

(AUTONOMOUS)

II/IV B.Tech. DEGREE EXAMINATION, JULY, 2022

Fourth Semester

INFORMATION TECHNOLOGY

20IT4303 ADVANCED DATA STRUCTURES AND ALGORITHMS

Time: 3 hours

Max. Marks: 70

Part-A is compulsory

Answer One Question from each Unit of Part - B

Answer to any single question or its part shall be written at one place only

PART-A

10 x 1 = 10M

1.
 - a. Define a splay tree.
 - b. Define space complexity.
 - c. Find the time complexity of quick sort.
 - d. Distinguish between divide and conquer and greedy methods.
 - e. Write the general method of dynamic programming.
 - f. What is purging rule for 0/1 knapsack problem?
 - g. Define the terms live-node and dead-node.
 - h. What is chromatic number of a graph?
 - i. Distinguish between dynamic knapsack and branch and bound knapsack problems.
 - j. Define satisfiability.

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PART-B

4 x 15 = 60M

UNIT-I

2. a. Define a Red-Black tree. Explain how to implement bottom-up insertion in Red-Black trees. 7M
- b. Discuss briefly about the concept of Suffix trees. 8M

(or)

3. a. Define algorithm. Explain the properties of an algorithm. 7M
- b. Create a recursive function to compute factorial of a number and determine its time complexity. 8M

UNIT-II

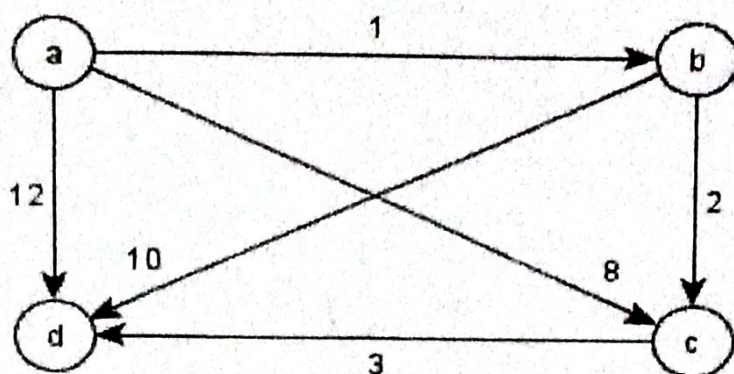
4. Illustrate merge sort algorithm with an example. 15M

(or)

5. a. Define feasible and optimal solutions. 4M
- b. Find the optimal solution of the Knapsack instance 11M
 $n=7, m=15, (p_1, p_2, \dots, p_7) = (10, 5, 15, 7, 6, 18, 3)$
and $(w_1, w_2, \dots, w_7) = (2, 3, 5, 7, 1, 4, 1)$

UNIT-III

6. Construct all pair shortest paths for the following graph. 15M



(or)

7. a. Summarise the importance of reliability design. 7M
b. Illustrate graph coloring problem with an example. 8M

UNIT-IV

8. Solve the 0/1 knapsack problem using branch and bound method for the following data: $m=15$, $n=4$, $(p_1, p_2, p_3, p_4) = (10, 10, 12, 18)$ and $(w_1, w_2, w_3, w_4) = (2, 4, 6, 9)$. 15M

(or)

9. a. Discuss about travelling salesman problem. 7M
b. Distinguish between NP-Hard and NP-Complete problems. 8M

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