

Code No: 5405AA

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**M.Tech I Semester Examinations, January - 2020****ADVANCED ALGORITHMS****(Computer Science)****Time: 3hrs****Max.Marks:75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 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**5 × 5 Marks = 25**

- 1.a) Explain the role of algorithms in computing. [5]
- b) Construct the open hash table and closed hash table for the input: 30, 20, 56, 75, 31, 19 using the hash function $h(k) = k \bmod 11$. [5]
- c) Discuss briefly about amortized analysis. [5]
- d) Give an example to explain graph representation methods. [5]
- e) Write a short note on clique problem. [5]

PART - B**5 × 10 Marks = 50**

2. Solve $x(n) = 3x(n-1)$ for $n > 1$ $x(1) = 4$ using Recurrence method and Master Theorem method. [10]
- OR**
3. Using Divide and Conquer Technique solve maximum subarray problem. [10]
4. Write an algorithm to merge the nodes of two AVL trees to obtain a new AVL tree. What is the computing time of your algorithm. [10]
- OR**
5. Explain the insertion and deletion operations in red black trees with examples. [10]
6. Using dynamic programming explain how optimal paranthesization is performed. [10]
- OR**
7. Obtain the optimal Huffman codes for the messages (M_1, \dots, M_7) with relative frequencies $(q_1, \dots, q_7) = (4, 5, 7, 8, 10, 12, 20)$. Draw the decode tree for this set of codes. [10]

8. For the following graph calculate the shortest path from start vertex 'A' using the Dijkstra's Algorithm as shown in figure 1. [10]

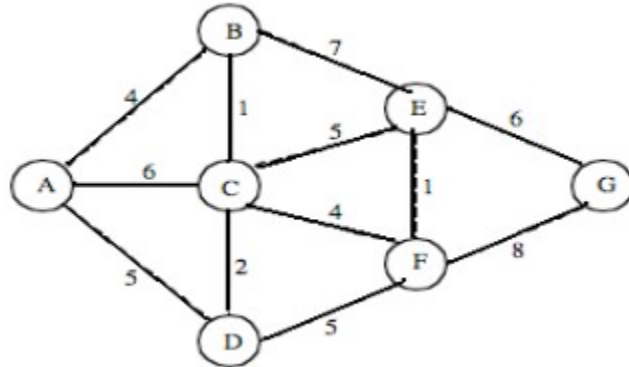


Figure: 1
OR

9. What are Spanning Tree and Minimum Spanning Tree (MST)? Write Kruskal's algorithm to find MST and apply the algorithm on the following graph. As shown in figure 2. [10]

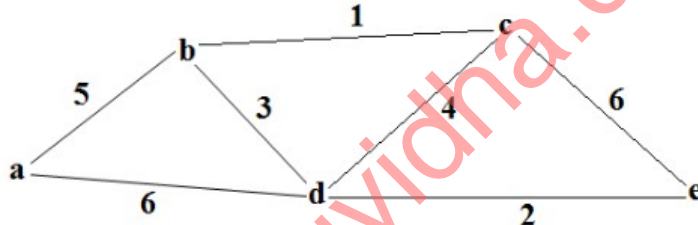


Figure: 2

10. Write an approximation algorithm to solve travelling sales man problem. [10]
OR
11. Explain in detail about 3 CNF satisfiability problem. [10]

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