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M S RAMAIAH INSTITUTE OF TECHNOLOGY

(AUTONOMOUS INSTITUTE, AFFILIATED TO VTU)

BANGALORE – 560 054

SEMESTER END EXAMINATIONS - JANUARY 2010

Course & Branch:	**B.E (Information Science and Engg.)**	**Semester: V**
Subject:	**Analysis and Design of Algorithms**	**Max. Marks: 100**
Subject Code:	**IS51**	**Duration: 3 Hrs**

Instructions to Candidates:

1. **Answer one Full question from each unit.**

UNIT-I

1. a) Define an algorithm. Describe the sequence of steps in designing and analyzing an algorithm with a neat diagram. (10)

   b) If $t_1(n) \in O(g_1(n))$ and $t_2(n) \in O(g_2(n))$, then prove that $t_1(n) + t_2(n) \in O(\max\{g_1(n), g_2(n)\})$. (10)

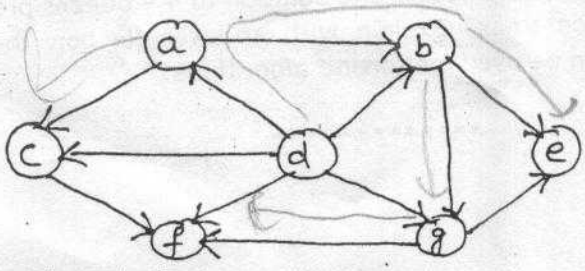
2. a) Define "Big Oh", "Big Theta" and "Big Omega" notations with an example for each. (10)

   b) Define exhaustive search. Explain with an example, how exhaustive search may be applied to travelling salesman problem. (10)

UNIT-II

3. a) Briefly explain strassen's method of matrix multiplication and evaluate its efficiency.. (10)

   b) What is topological sorting? Solve the topological sorting problem for the digraph given below by applying DFS - based algorithm. (10)



4. a) Suggest pseudo code for (12)
   i) Depth first search
   ii) Breadth first search
   Illustrative with suitable examples.

   b) Write an algorithm for quick sort method and sort the following list of numbers using the same. [20,5,35,16,1,40,30,23,80] (08)

UNIT-III

5. a) What is presorting? Suggest an example that illustrates the idea of presorting and analyze its efficiency. (10)

   b) Write the Horspool's algorithm to count the number of occurrences of a pattern in the given string. Find the shift table for the pattern 'BARBER'. (10)

6. a) What is an AVL tree? Explain the need for rotation of AVL tress. Construct an AVL tree for the list 5,6,8,3,2,4,7 by successive insertions. Clearly mention the steps. (12)

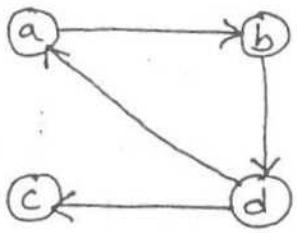
   b) Suggest an algorithm to construct a heap from the elements of a given array by the bottom - up approach. What is its complexity? (8)

UNIT-IV

7. a) Outline Kruskal's algorithm to find minimum cost spanning tree. Compare Prim's and Kruskal's method with respect to time and space. (10)

   b) Describe an algorithm with an example to compute binomial coefficient and derive its time efficiency. (10)

8. a) State the purpose of Warshall's algorithm and explain the same for the following digraph. (10)



   b) What is a Huffman tree? Outline an algorithm to construct a Huffman tree. (10)

UNIT-V

9. a) Write a brief note on P, NP and NP complete problems. (10)

   b) Discuss branch - and - bound solution for Knapsack problem. (10)

10. a) What is backtracking? Explain how backtracking can be used to solve n - Queens problem and obtain one solution to 4 - queens problem. (10)

    b) What are decision trees? Explain with an example how the concept of decision trees can be used for sorting algorithms. (10)

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