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Reg. No. : .....

Name : .....

Seventh Semester B.Tech. Degree Examination, November 2012
(2008 Scheme)
Branch : Computer Science
08.702 : DESIGN AND ANALYSIS OF ALGORITHMS (R)

Time : 3 Hours Max. Marks : 100

PART – A

(Answer **all** questions)

1. The need to be able to measure the complexity of a problem, algorithm or structure and to obtain bounds and quantitative relations for complexity arises in more and more sciences. Justify this statement by giving a suitable example. 4

2. With a neat figure explain the comparison of different orders of complexity. The horizontal axis shall represent the size of the problem and the vertical axis shall represent the computational effort required by algorithms for each class. 4

3. State and explain Master theorem. 4

4. Analyse the complexity of bubble sort algorithm using recurrence relation. 4

5. Prove that an AVL tree with *n* nodes has height O (lgn). 4

6. Write in pseudo code for deleting an element from a binary search tree. What is the time complexity of your algorithm ? 4

7. Write an algorithm for BFS traversal on a graph and explain it. 4

8. Explain a greedy technique for solving optimisation problem. 4

9. What do you mean by NP-complete problem ? How to solve such problems practically ? 4

10. Explain 0-1 knapsack problem. 4

PART – B

Answer **one** question from **each** module.

Module – I

11. a) Write pseudocode, which multiplies two polynomials represented using arrays. What is the computing time of your function ? 12

    b) Explain heap sort algorithm. 8

12. a) i) Using masters theorem solve the following : 8

    1) $T(n) = 4T(n/2) + cn$ 2) $T(n) = 2T(n/2) + n^3$

    b) i) Explain the randomised version of Quick sort algorithm with an example. 10

    ii) What is the time required to access one element from a linear array ? 2

Module – II

13. a) Apply depth first and breadth first search to a complete graph on four vertices. List the vertices in the order they would be visited. 6

    b) i) Describes how to compute a minimum-weight spanning tree of a graph. 7

    ii) Given a directed graph G = (V, E), a weighting function w(e) for the edges of G and a source vertex v_0. Write an algorithm to determine the shortest paths from v_0 to all the remaining vertices of G. 7

14. a) i) List four properties of Red-Black Trees. 2

    ii) Explain the steps involved in deletion of a node from Red black tree. 8

    b) Write algorithm for union operation on sets implemented using singly linked list. What is the time complexity of the algorithm ? 10

Module – III

15. a) Write recursive version of merge sort and analyse best case, average case and worst case running time of the algorithm. 12

    b) Explain booths algorithm for the multiplication of integer numbers. 8

16. a) Write note on the following :

    i) Greedy versus dynamic programming. 5

    ii) Branch and bound algorithm for travelling salesman problem. 5

    iii) Divide and conquer techniques. 5

    b) Briefly explain Strassen's matrix multiplication algorithm. 5