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Reg. No. : .....

Name : .....

Seventh Semester B.Tech. Degree Examination, April 2015
(2008 Scheme)
08.702 DESIGN AND ANALYSIS OF ALGORITHMS (R)

Time : 3 Hours Max. Marks : 100

PART – A

Answer **all** questions.

1. Explain time complexity and space complexity of algorithms.
2. The iteration method to solve the recurrence relation $T(n) = 3T(\lfloor n/2 \rfloor) + n$.
3. What is the effect of calling MAX-HEAPIFY (A,i), when the element A [i] is larger than its children ? What is the effect of calling MAX-HEAPIFY (A,i) for i > n/2.
4. What are the basic properties of B-Trees ?
5. Explain topological sorting with an example.
6. Analyze the complexity of Depth First Search (DFS) algorithm.
7. Explain the heuristics used to improve the running time of disjoint set operations.
8. Briefly explain dynamic programming method of problem solving.
9. Explain optimal substructure property.
10. Define an NP-complete problem. **(10×4= 40 Marks)**

PART – B

Answer **one** question from **each** Module.

Module – I

11. a) Discuss about the asymptotic notations used for expressing the time complexity of algorithms. 6

b) Use substitution method to solve the recurrence relation $T(n) = 2T(n/2) + n$. 8

c) Analyze the performance of Quiksort in best care, average care and worst care. 6

OR

12. a) What is a priority queue ? Discuss how you will implement priority queue operation using a heap data structure. 12

b) Use Master Method to solve the recurrence relation $T(n) = 3T(n/4) + n \lg n$. 8

Module – II

13. a) What are the basic properties of red black trees ? Discuss an algorithm to insert a new node into a red black tree ? 12

b) Explain Prim's algorithm. Analyse its time complexity. 8

OR

14. a) What are height balanced trees ? Discuss about the different AVL rotations. 12

b) What are strongly connected components ? Discuss an algorithm to find strongly connected components of a graph. 8

Module – III

15. Explain branch and bound technique used in problem solving. How will you solve travelling salesman problem (TSP) using branch and bound ? 20

OR

16. Explain Strauseu's algorithm used for matrix multiplication. Use strauseu's algorithm to compute the matrix product of the following matrices. $\begin{pmatrix} 1 & 3 \\ 5 & 7 \end{pmatrix}$ and $\begin{pmatrix} 8 & 4 \\ 6 & 2 \end{pmatrix}$. 20