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Reg. No. : .....

Name : .....

Seventh Semester B.Tech. Degree Examination, May 2013
(2008 Scheme)
08.702 : DESIGN AND ANALYSIS OF ALGORITHMS (R)

Time : 3 Hours Max. Marks : 100

PART – A

Answer **all** questions. **(10×4=40 Marks)**

1. Define omega notation for a function f(n).
2. Derive the time complexity of quicksort algorithm.
3. What is a recursion tree ? Construct one for $T(n) = 2T(n/2)+n$.
4. Show that $\log(n!) = \theta(n \log n)$.
5. Explain strongly connected components.
6. Insert the following keys in order; starting with an empty Red Black Tree : 10, 20, 50, 80, 1000, 1020.
7. Explain the properties of a Red Black Tree.
8. Explain NP-hardness with an example.
9. Explain dynamic programming.
10. Are all NP-complete problems NP-hard ? Justify.

PART – B

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

MODULE – I

11. a) Using substitution method solve

$$T(n) = \begin{cases} 2T\left(\left\lfloor n/2 \right\rfloor\right)+1 , & n>=2 \\ 1 \quad ;n=1 \end{cases}$$ **10**

b) Solve $T(n) = 8T(n/2) + n^2$ by iteration method. **10**

OR

12. Give an algorithm for performing heapsort. Derive an expression for its running time. Explain with an example. **20**

MODULE – II

13. How is deletion performed in
    a) B-trees ?
    b) RB trees ? Give algorithms. **20**

OR

14. a) Explain Prim's algorithm and find its time complexity. **10**
    b) Give an algorithm for graph traversal. Analyse the algorithm. **10**

MODULE – III

15. a) Solve travelling salesman problem using greedy algorithm. **10**
    b) How does 0-1 knapsack problem differ from fractional knapsack problem ? **10**

OR

16. a) Give an algorithm to solve the 8-Queen's problem. **10**
    b) Give a dynamic programming solution to 0-1 Knapsack problem. **10**