(Pages : 3) **A – 3869**

Reg. No. : .....

Name : .....

Seventh Semester B.Tech. Degree Examination, June 2016
(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. Compare big-oh and little-oh notations.
2. Build a max-heap on the array A = {5, 3, 17, 10, 84, 19, 6, 22, 9}.
3. State Master Theorem.
4. Give a recurrence for quick-sort in which the partitioning algorithm always produces a 9-to-1 proportional split and solve it using a recursion-tree.
5. Give the properties of B-trees.
6. What is an AVL tree ? Array A = {8, 6, 10, 4, 7, 9, 11, 3, 5} represents an AVL tree. Insert 2 into the tree and get the resultant AVL tree.
7. Give an algorithm for topological sorting.
8. Define 8-Queen's problem.
9. What is vertex-cover problem ?
10. What is 0-1 Knapsack problem ? How does it differ from fractional knapsack problem ?

P.T.O.

PART – B

Answer **one full** question from **each** Module : **(20×3=60 Marks)**

Module – I

11. a) What is a recurrence relation. Give an example. 3

    b) Using Master-method, solve $T(n) = 16T(n/4) + n^3$. 4

    c) Using a recursion-tree, find the solution to the recurrence :

    $T(n) = T(n/3) + T(2n/3) + 0(n)$. 4

    d) Show that the solution to $T(n) = 2T\left(\lfloor n/2 \rfloor + 17\right) + n$ is O (n lg n) by substitution method. 4

    e) What are the different operations possible on a max-priority queue ? Give an algorithm for heap-extract-maximum element. 5

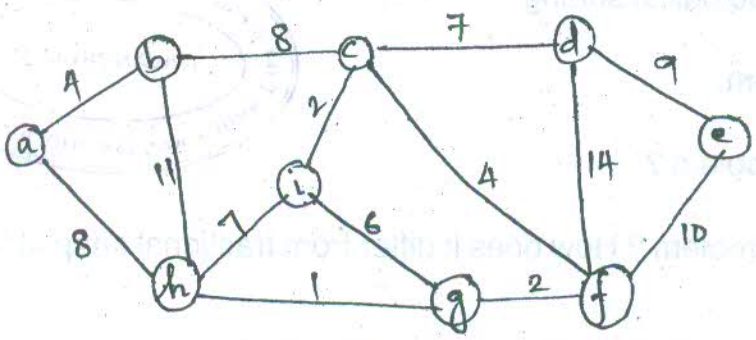
OR

12. a) What are randomised algorithms ? Write an algorithm for randomised version of quicksort and give its analysis. 12

    b) What is a priority queue ? Suggest a method for implementing priority queue and its operations. 8

Module – II

13. a) Execute Kruskal's algorithm on the graph below : 10



    b) Give an algorithm for BFS and give its analysis. 10

OR

14. a) What are the different cases in deletion of a node from a red-black tree ? 15

b) Suppose that a mode x is inserted into RB tree and then deleted immediately. Is the resulting RB tree same as the initial RB tree ? Justify your answer. 5

Module – III

15. a) Obtain an optimal paranthesization for a chain of 6 matrices $A_1, A_2 \ldots A_6$ following is their dimension :

$A_1 - (30 \times 35)$, $A_2 - (35 \times 15)$, $A_3 - (15 \times 5)$,

$A_4 - (5 \times 10)$, $A_5 - (10 \times 20)$, $A_6 - (20 \times 25)$. 15

b) Compare dynamic programming and divide and conquer strategies. 5

OR

16. a) Write an algorithm for merge sort using divide and conquer. Determine its time complexity. 10

b) Give an algorithm for matrix multiplication that outperforms the usual $\theta(n^3)$ matrix multiplication algorithm . 10
