(Pages : 3) **A – 2768**

Reg. No. : .....

Name : .....

Sixth Semester B.Tech. Degree Examination, May 2016
(2013 Scheme)
13.603 : DESIGN AND ANALYSIS OF ALGORITHMS (FR)

Time : 3 Hours Max. Marks : 100

PART – A

Answer **all** questions.

1. Design an algorithm to find all the common elements in two sorted lists of numbers.
2. Draw diagrams of the single L-rotation and of the double RL-rotation of an AVL Tree in their general form.
3. Explain the concept of backtracking algorithm and how it is different from dynamic programming.
4. Prove that the topological sorting problem has a solution if and only if it is a dag.
5. How to determine whether a tree is height balanced ? **(5×4=20 Marks)**

PART – B

Answer **any one full** questions from **each** Module.

Module – I

6. a) Construct a heap for the list 1, 8, 6, 5, 3, 7, 4 by the bottom-up algorithm. Compute the worst-case computational complexity of heapsort. **15**

   b) Explain randomised version of quick sort. **5**

   OR

7. a) Write insertion sort algorithm and analyze best, average and worst case.

   b) Find the order of growth for solutions of the following recurrences with substitution method.

      i) $T(n) = 2T(n/2) + n$, for $n > 1$, $T(1) = 0$

      ii) $T(n) = 3T(n/2)$ for $n > 1$, $T(1) = 1$ **(10+10)**

P.T.O.

Module – II

8. Write an algorithm for constructing an AVL tree for a given list of n distinct integers and analyze the time complexity. 20

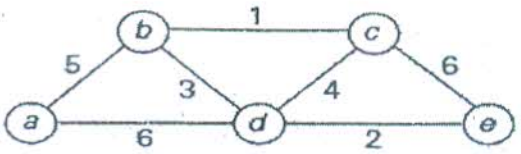
OR

9. a) Explain the properties of B Trees and Show how to find minimum key and predecessor stored in the B Tree.

   b) Write an algorithm to find connected components in a graph. (12+8)

Module – III

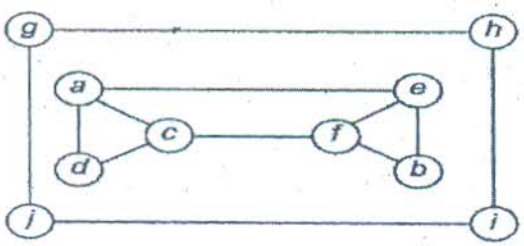
10. a) Write Kruskal's algorithm for finding the minimum spanning tree. Apply Kruskal's algorithm to the following graph.



   b) Explain Strassen's matrix multiplication method. (12+8)

OR

11. a) Write a recursive algorithm for depth first search traversal. Starting at vertex a and resolving ties by the vertex alphabetical order, traverse the graph by depth-first search and construct the corresponding depth-first search tree. Give the order in which the vertices were reached for the first time (pushed onto the traversal stack) and the order in which the vertices became dead ends (popped off the stack). 20



Module – IV

12. a) Write an algorithm to multiply matrices using matrix chain multiplication method.

    b) Distinguish between NP complete and NP hard problems. (15+5)

OR

13. a) Discuss the pros and cons of greedy and dynamic programming method to solve the knapsack problem. Prove that the fractional knapsack problem has the greedy-choice property.

    b) Explain 8-queen's problem. (10+10)