

III B.Tech I Semester Supplementary Examinations, May 2005
DESIGN AND ANALYSIS OF ALGORITHMS
(Common to Information Technology and Computer Science & Systems
Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. Given three sets $\{1, 3, 5, 7\}$, $\{2, 4, 8\}$ and $\{6\}$ in which $n=8$ with external names 1,2 and 3 respectively with the corresponding internal names 2,3 and 1. Write the data structure for UNION-FIND algorithm using a linked list. Then write the data structure after UNION instruction
2. (a) The worst-case time of procedure MERGESORT is $O(n \log n)$. What is its time in the best case? Can we say that the time for merge sort is $\theta(n \log n)$?
(b) What is a STABLE SORTING Method? Is merge sort a stable sorting method?
3. Explain the Prim's algorithm with an example. Analyze the time complexity of the algorithm.
4. Use an AVL tree as the basis of an algorithm to execute MIN, UNION, and DELETE on sets consisting of integers 1 through n , using $O(\log n)$ steps per operation.
5. (a) Design a three stage system with device types D1,D2 and D3. The costs are Rs.30, Rs.15 and Rs.20 respectively. The cost of the system is to be no more than Rs.105. the reliability of each device type is 0.9, 0.8 and 0.5 respectively.
(b) Explain in detail the reliability design problem.
6. Show that
(a) The inorder and postorder sequences of a binary tree uniquely define the binary tree.
(b) Write a detail note on depth first graph traversal algorithm.
7. Define the following terms: state space, explicit constraints, implicit constraints, problem state, solution states, answer states, live node, E-node, dead node, bounding functions.
8. What is interpolation? Explain Lagrange interpolation algorithm & Newtonian Interpolation algorithm.
