

III B.Tech I Semester Regular Examinations, November/December 2005
DESIGN AND ANALYSIS OF ALGORITHMS
(Computer Science & Systems Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
 All Questions carry equal marks

1. (a) Solve the recurrence relation of formula

$$T(n) = \begin{cases} g(n), & n \text{ is small} \\ 2T(n/2) + F(n), & \text{otherwise} \end{cases}$$

when

i. $g(n) = O(1)$ and $f(n) = O(n)$;

ii. $g(n) = O(1)$ and $f(n) = O(1)$. [6]

- (b) Write a recursive binary search program. [10]

2. (a) Write an algorithm of Quick sort and explain in detail.

- (b) Suggest refinements to Merge sort to make it in-place. [8+8]

3. (a) Explain the control at straction of Greedy method compare this with Dynamic programming. [4]

- (b) Applying the Greedy stentegy find the solution for optimal storage on tapes problem instance $n = 3, (l_1, l_2, l_3) = (5, 10, 3)$. [6]

- (c) Explain the 0/1 knap sack problem algorithm with Greedy concept. [6]

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. . [16]

5. Using a dynamic programming approach coupled with the set generation approach, show how to obtain an $O(2^{n/2})$ algorithm for the 0/1 knapsack problem. [16]

6. Write and explain a non-recursive algorithm for inorder traversal of a binary tree with an example. What is the time & space complexity of your algorithm? [16]

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. [16]

8. Devise a divide-and-conquer algorithm to evaluate a polynomial at a point. Analyze carefully the time complexities for your algorithm. [16]
