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V 4543

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2008.

Third Semester

(Regulation 2004)

Computer Science and Engineering

CS 1201 — DESIGN AND ANALYSIS OF ALGORITHMS

(Common to B.E. (Part-Time) Second Semester Regulation 2005)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. How many comparisons of array elements do the following loops contain?

```
for(j=1; j<=n-1; j++){  
    I = j + 1;  
    do {  
        if(a[I] < a[j]) then  
            Swap(a[I], a[j]);  
        I = I + 1;  
    } while(I > n);  
}
```

2. Why would one opt for an approximation algorithm when it is clear that the problem is not exactly solvable?
3. Write a recursive function to find the factorial of a number n .
4. How does algorithm visualization aid in studying algorithms?
5. Differentiate between the 3 binary tree traversals.

6. Write down how to find if the pattern "will" is present in the text. "Where there is will there is way" using brute force approach.
7. How does presorting help in solving searching problems?
8. What is the major drawback in Huffman encoding and how is it overcome?
9. Compare feasible and optimal solution.
10. Give a formal definition of the n -queen's problem.

PART B — (5 × 16 = 80 marks)

11. (a) (i) How does computing the limit help in comparing the orders of growth of 2 specific functions? Compare the orders of growth of $n + n \log n$ and $n \cdot n^{1/2}$. (7)
- (ii) Give the general framework for analyzing the efficiency of algorithms. (9)

Or

- (b) The maximum subsequence problem is stated as follows :

Given (possibly negative) integers a_1, a_2, \dots, a_n , find the maximum value of $\sum_{k=1}^j a_k$ (For convenience, the maximum subsequence sum is 0 if all the integers are negative).

Example : For input -2, 11, -4, 13, -5, -2, the answer is 20 (a_2 through a_4)

Write a pseudocode for the above problem such that the running time is

- (i) $O(n^3)$. (8)
 - (ii) $O(n^2)$. (8)
12. (a) (i) Write a pseudocode to find the largest element in a list of n elements. Give the general plan for analyzing the efficiency of nonrecursive algorithms and analyze the pseudocode based on the general plan. (8)
 - (ii) Write an algorithm to find the number of binary digits in n 's binary representation and analyse the same. (8)

Or

- (b) How does the empirical analysis and algorithm visualization serve as alternative approaches to the mathematical analysis of an algorithm's efficiency? (16)

