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Question Paper Code : 50270

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2012.

Third/Fourth Semester

Computer Science and Engineering

CS 1201/CS 1251 — DESIGN AND ANALYSIS OF ALGORITHMS

(Regulation 2004)

(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. Define time efficiency and space efficiency.
2. What is best case efficiency?
3. Give the algorithm to compute factorial of n recursively.
4. What is algorithm visualization? What are its variations?
5. Give four examples for bruteforce approach.
6. What is the worst case and average case efficiency of binary search?
7. What is dynamic programming?
8. What is Huffman tree? State its application.
9. Define promising and nonpromising nodes in a state space tree.
10. State Knapsack problem.

PART B — (5 × 16 = 80 marks)

11. (a) List and briefly discuss the sequence of steps typically goes through in designing and analyzing an algorithm with flow chart. (16)

Or

(b) (i) Define three asymptotic notations with example. (8)

(ii) Discuss the basic asymptotic efficiency classes in detail. (8)

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12. (a) (i) Give the general plan for analyzing time efficiency of nonrecursive algorithms. (5)

(ii) Given two *n-by-n* matrices *A* and *B*, write the definition-based algorithm for computing their product $C = AB$ and find the time efficiency. (11)

Or

(b) (i) Define Fibonacci numbers and give the faster algorithm to compute the successive elements of the Fibonacci sequence iteratively. (8)

(ii) Give the general plan for empirical analysis of algorithm time efficiency and explain each step. (8)

13. (a) Write a pseudocode for a divide-and-conquer algorithm to sort an array of n numbers using merge sort and discuss its efficiency. Illustrate the operation of the algorithm on the list 8, 3, 2, 9, 7, 6, 5, 4. (16)

Or

(b) Discuss breadth first search as an application of decrease and conquer technique with example, pseudo code and efficiency. (16)

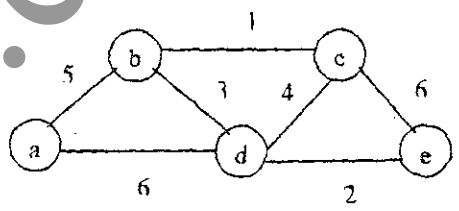
14. (a) (i) Define and explain AVL trees with example. (8)

(ii) Apply Warshall's algorithm to find the transitive closure of the digraph defined by the following adjacency matrix (8)

$$\begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

Or

(b) Give the pseudo code for Kruskal's algorithm to construct a minimum spanning tree. Apply Kruskal's algorithm to find a minimum spanning tree of the following graph. (16)



15. (a) Discuss the following with example

(i) *n* queen's problem (8)

(ii) Hamiltonian circuit problem (8)

Or

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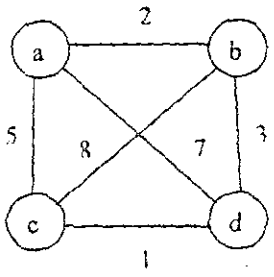
(b) Explain travelling salesman problem. Apply the branch-and-bound algorithm to solve the travelling salesman problem for the following graph. (16)



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