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Question Paper Code : 21379

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Fourth Semester

Computer Science and Engineering

CS 2251/CS 41/CS 1251/080230013/10144 CS 402 — DESIGN AND ANALYSIS OF ALGORITHMS

(Regulations 2008/2010)

(Common to PTCS 2251/10144 CS 402 – Design and Analysis of Algorithms for B.E. (Part-Time) Third Semester — Computer Science and Engineering — Regulations 2009/2010)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1.   What are the components of fixed and variable part in space complexity?

2.   Define little Oh and Omega notations.

3.   What do you mean by divide and conquer strategy?

4.   Write the control abstraction for the ordering paradigm.

5.   State principle of optimality.

6.   List out the advantages of dynamic programming.

7.   What is the difference between explicit and implicit constraints?

8.   Define the basic principles of backtracking.

9.   State the difference between FIFO and LC branch-and-bound algorithms.

10.   Where do you apply problem reduction method?

PART B — (5 × 16 = 80 marks)

11. (a) Discuss the properties of big Oh notation.   (16)

Or

(b) With an example, explain how recurrence equations are solved.   (16)

12. (a) Explain the divide and conquer method with merge sort algorithm. Give an example.   (16)

Or

(b) Explain how are greedy method can be applied to solve the knapsack problem.   (16)

13. (a) (i) Explain the multistage graph problem with an example.   (8)

(ii) Write a dynamic programming solution for the traveling sales person problem for the network with the cost adjacency matrix.   (8)

$$\begin{matrix} 0 & 10 & 15 & 30 \\ 4 & 0 & 9 & 11 \\ 5 & 13 & 0 & 10 \\ 7 & 7 & 8 & 0 \end{matrix}$$

Assume node 1 as the home city.

Or

(b) Describe all pairs shortest path problem and write procedure to compute lengths of shortest paths.   (16)

14. (a) (i) Using backtracking technique, solve the following instance of the subset sum problems $s = (1, 3, 4, 5)$ and $d = 11$.   (8)

(ii) Explain 8-Queens problem with an algorithm. Explain why backtracking is the default procedure for solving problems.   (8)

Or

(b) Explain the algorithms using backtracking technique, to solve the following problems

(i) Graph coloring   (8)

(ii) Hamiltonian problem.   (8)

15. (a) (i) Explain the Kruskal's algorithm for constructing minimum cost spanning tree. (8)

(ii) Describe the deterministic and non-deterministic algorithms. (8)

Or

(b) Solve the following 6 city traveling salesperson problem using the branch and bound algorithm. (16)

$$\begin{bmatrix} \alpha & 21 & 42 & 31 & 6 & 24 \\ 11 & \alpha & 17 & 7 & 35 & 18 \\ 25 & 5 & \alpha & 27 & 14 & 9 \\ 12 & 9 & 24 & \alpha & 30 & 12 \\ 14 & 7 & 21 & 15 & \alpha & 48 \\ 39 & 15 & 16 & 5 & 20 & \alpha \end{bmatrix}$$

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