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Question Paper Code : 51341

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2014.

Fourth Semester

Computer Science and Engineering

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

(Regulation 2008/2010)

(Common to PTCS 2251 – Design and Analysis of Algorithms for B.E. (Part-Time) Third Semester – Computer Science and Engineering – Regulation 2009)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is average case analysis?

2. Define program proving and program verification.

3. State the principle of Substitution method.

4. Define feasible and optimal solution.

5. State Principle of optimality.

6. List out the advantages of Dynamic programming.

7. What are explicit and implicit constraints?

8. What is chromatic number?

9. Define connected components.

10. Compare NP-hard and NP-completeness.

PART B — (5 × 16 = 80 marks)

11. (a) (i) What are the features of an efficient algorithm? Explain.

   (ii) What is space complexity? With an example, explain the components of fixed and variable part in space complexity.

Or

   (b) (i) Explain Towers of Hanoi problem and solve it using recursion.

   (ii) Derive the recurrence relation for Fibonacci series algorithm; also carry out the time complexity analysis.

12. (a) (i) Trace maximum and minimum (using divide conquer) algorithm for the following set of numbers. 20, 35, 18, 8, 14, 41, 3, 39, –20.

   (ii) Write a pseudo code using divide and conquer technique for finding the position of the largest element in an array of N numbers.

Or

   (b) (i) Sort the following set of elements using merge sort : 12, 24, 8, 71, 4, 23, 6, 89, 56.

   (ii) Solve the given knapsack problem using greedy technique.

   $n = 3, m = 20, (p1, p2, p3) = (25, 24, 15), (w1, w2, w3) = (18, 15, 10)$.

13. (a) (i) Solve All-pairs shortest path problem for the digraph with the weight matrix given below.

	A	B	C	D
A	0	∞	∞	3
B	2	0	∞	∞
C	∞	7	0	1
D	6	∞	∞	0

   (ii) Explain the 0/1 knapsack with an algorithm.

Or

   (b) What is multistage graph? Explain with an example. Write the pseudo code for the finding the minimum cost path using forward and backward approach.

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

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

Or

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

(i) Graph Coloring

(ii) Hamiltonian problem.

15. (a) (i) Write notes on deterministic and non-deterministic algorithms.

(ii) Define spanning tree. Discuss the design steps in Kruskal algorithm to construct minimum spanning tree with example.

Or

(b) (i) Compare Backtracking Branch and Bound techniques with example.

(ii) With suitable sample graph, explain the breadth first search and depth first search algorithm.

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