Reg. No. :

Question Paper Code : 21301

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2013.

Fourth Semester

Computer Science and Engineering

CS 2251/CS 41/CS 1251/10144 CS 402/080230013 — 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 do you mean by algorithm?

2. Define big-Oh notation.

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

4. Write control abstraction for the ordering paradigm.

5. Define multistage graphs.

6. What is knapsack problem?

7. What is Hamiltonian cycle?

8. Define sum of subset problem.

9. Distinguish between BFS and DFS.

10. An NP – hard problem can be solved in deterministic polynomial time, how?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Briefly explain the time complexity, space complexity estimation. (6)

(ii) Write the linear search algorithm and analyze its time complexity. (10)

Or

(b) Show the following equalities are correct

(i) $5n^2 - 6n = \phi(n^2)$

(ii) $n! = 0(n^n)$

(iii) $n^3 + 10^6 n^2 = \theta(n^3)$

(iv) $2n^2 2^n + n \log n = \theta(n^2 2^n)$. (16)

12. (a) Distinguish between Quick sort and merge sort, and arrange the following numbers in increasing order using merge sort. (18, 29, 68, 32, 43, 37, 87, 24, 47, 50). (16)

Or

(b) Define Greedy Algorithm and find an optimal solution to the knapsack instance $n = 7, m = 15$.

$(p1, p2, p3, \ldots p7) = (10, 5, 15, 7, 6, 18, 3)$ and

$(w1, w2, w3, \ldots w7) = (2, 3, 5, 7, 1, 4, 1)$. (16)

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

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

0	10	15	30
4	0	9	11
5	13	0	10
7	7	8	0

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)

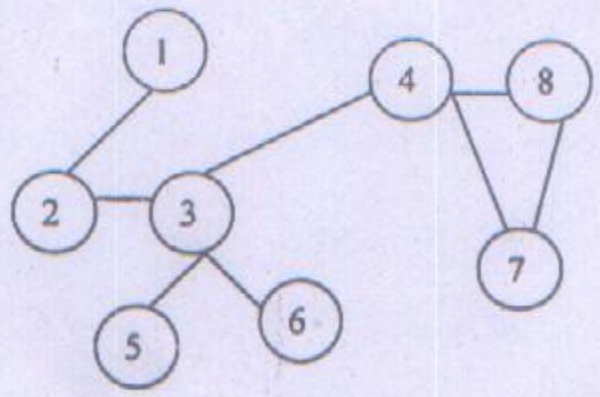
14. (a) How backtracking works on the 8 Queens problem with suitable example? (16)

Or

(b) (i) Write a backtracking program for solving the knapsack optimization problem. (8)

(ii) Explain elaborately recursive backtracking algorithm. (8)

15. (a) For the following graph identify and explain the articulation points and draw the bi-connected components. (16)



Or

(b) Write a complete LC branch-and-bound algorithm for the job sequencing with deadlines problem. Use the fixed tuple size formulation. (16)