Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 20364

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2018.

Third/Fourth Semester

Computer Science and Engineering

CS 6402 — DESIGN AND ANALYSIS OF ALGORITHMS

(Common to Information Technology)

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define algorithm. List the desirable properties of an algorithm.

2. Define best, worst, average case time complexity.

3. What are the differences between dynamic programming and divide and conquer approaches?

4. Give an example for Hamiltonian circuit.

5. Define multistage graphs. Give an example.

6. How dynamic programming is used to solve Knapsack problem?

7. Describe iterative improvement technique.

8. What is solution space? Give an example.

9. Define P and NP problems.

10. Give an example for sum-of-subset problem.

PART B — (5 × 13 = 65 marks)

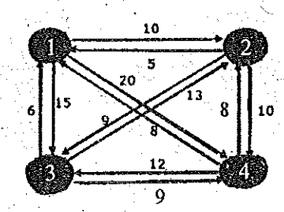
11. (a) (i) Prove that if $g(n)$ is $\Omega(f(n))$ then $f(n)$ is $O(g(n))$. (5)

(ii) Discuss various methods used for mathematical analysis of recursive algorithms. (8)

Or

(b) Write the asymptotic notations used for best case, average case and worst case analysis of algorithms. Write an algorithm for finding maximum element in an array. Give best, worst and average case complexities. (13)

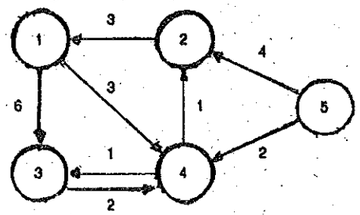
12. (a) Solve travelling salesman problem using brute force approach for the given example. How the solution can be obtained using branch and bound method? (10 + 3)



Or

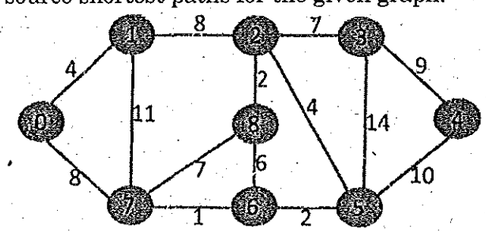
(b) Write the algorithm for quick sort. Provide a complete analysis of quick sort for the given set of numbers 12, 33, 23, 43, 44, 55, 64, 77 and 76. (13)

13. (a) Explain Floyds – Warshall algorithm using dynamic programming. Trace the algorithm for the given example. (13)



Or

(b) Explain how greedy approach is used in Dijkstra's algorithm for finding the single–source shortest paths for the given graph. (13)



14. (a) Illustrate the steps of the simplex methods with an example. (13)

Or

(b) Write the stable marriage algorithm and trace it with an instance. Analyze its running time complexity. (13)

15. (a) Consider the travelling salesperson instance defined by the following cost matrix. (13)

∞	20	30	10	11
15	∞	16	4	2
3	5	∞	2	4
19	6	18	∞	3
16	4	7	16	∞

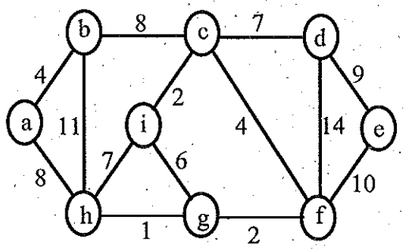
Draw the state space tree and show the reduced matrices corresponding to each of the node.

Or

(b) Discuss the approximation algorithm for NP-hard problems. (13)

PART C — (1 × 15 = 15 marks)

16. (a) Apply the greedy technique to find the minimum spaning tree using Prim's algorithm for the given graph. (15)



Or

(b) Explain the 4-Queen's problem using backtracking. Write the algorithms. Give the estimated cost for all possible solutions of 4-Queen's problem. Specify the implicit and explicit constraints. (15)