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

Question Paper Code : 52863

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY, 2019.

Third/Fourth Semester

Computer Science and Engineering

CS 6402 — DESIGN AND ANALYSIS OF ALGORITHMS

(Common to Information Technology)

(Regulation 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Design an algorithm to compute the area and Circumference of a circle.
2. Define recurrence relation.
3. Give the general strategy of Divide and Conquer Method.
4. What is the closest - pair problem?
5. State the general principle of greedy algorithm
6. What do you mean by dynamic programming?
7. What do you mean by 'perfect matching' in bipartite graphs?
8. Define flow 'cut'.
9. Draw the decision tree for comparison of three values.
10. Depict the proof which says that a problem 'A' is no harder or no easier than problem 'B'.

PART B — (5 × 13 = 65 marks)

11. (a) Briefly explain the mathematical analysis of recursive and non-recursive algorithm.

Or

(b) Explain briefly Big oh Notation, Omega Notation and Theta Notations. Give examples.

12. (a) (i) Write the algorithm to perform Binary Search and compute run time complexity.

(ii) Compute the multiplication of given two matrices using Strassen's matrix multiplication method.

$$A = \begin{bmatrix} 1 & 0 & 2 & 1 \\ 4 & 1 & 1 & 0 \\ 0 & 1 & 3 & 0 \\ 5 & 0 & 2 & 1 \end{bmatrix} \quad B = \begin{bmatrix} 0 & 1 & 0 & 1 \\ 2 & 1 & 0 & 4 \\ 2 & 0 & 1 & 1 \\ 1 & 3 & 5 & 0 \end{bmatrix}.$$

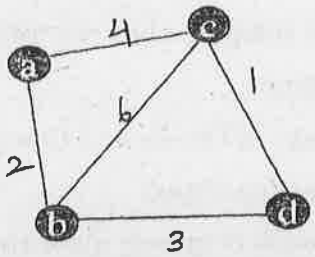
Or

(b) (i) Write down the algorithm to construct a convex hull based on divide and conquer strategy.

(ii) Find the optimal solution to the fractional knapsack problem with given data :

Item	Weight	Benefit
A	2	60
B	3	75
C	4	90

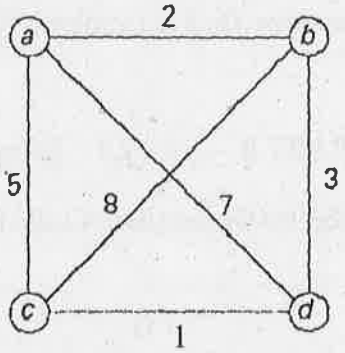
13. (a) Discuss about the algorithm and Pseudocode to find the Minimum Spanning Tree using Prim's Algorithm. Find the Minimum Spanning tree for the graph shown below :



And Discuss about the efficiency of the Algorithm.

Or

(b) Find all the Solution to the travelling salesman problem (cities and distances shown below) by exhaustive search. Give the optimal solution.



14. (a) (i) State and prove Max-Flow Min-Cut Theorem

(ii) Summarize the steps of the simplex method.

Or

(b) (i) Explain briefly about Stable marriage algorithm.

(ii) Determine the time-efficiency class of the stable marriage algorithm.

15. (a) (i) Suggest an approximation algorithm for traveling salesperson problem. Assume that the cost function satisfies the triangle inequality.

(ii) Explain how job assignment problem could be solved, given n tasks and n agents where each agent has a cost to complete each task, using Branch and Bound technique.

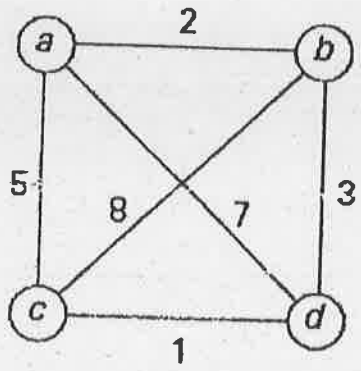
Or

(b) (i) The knight is placed on the first block of an empty board and, moving according to the rules of chess, must visit each square exactly once. Solve the above problem using backtracking procedure.

(ii) Implement an algorithm for Knapsack problem using NP-Hard approach.

PART C — (1 × 15 = 15 marks)

16. (a) Apply Branch and Bound algorithm to solve the Travelling Salesman Problem for (15)



Or

(b) Write an algorithm for quick sort and write its time complexity with example list are 5, 3, 1, 9, 8, 2, 4, 7. (15)