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

Question Paper Code : 40906

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 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. Give the Euclid's algorithm for computing gcd of two numbers.
2. What is a basic operation ?
3. What is an exhaustive search ?
4. State Master's theorem.
5. Define transitive closure of a directed graph.
6. Define the minimum spanning tree problem.
7. How is a transportation network represented ?
8. What is meant by maximum cardinality matching ?
9. How is lower bound found by problem reduction ?
10. What are tractable and non-tractable problems ?

PART – B **(5×13=65 Marks)**

11. a) Define Big O notation, Big Omega and Big Theta Notation. Depict the same graphically and explain.

(OR)

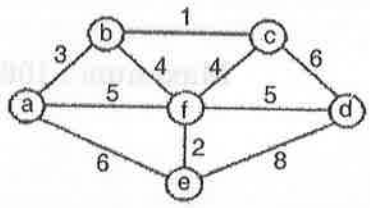
b) Give the General Plan for Analyzing the Time Efficiency of Recursive Algorithms and use recurrence to find number of moves for Towers of Hanoi problem.

12. a) Explain Merge sort algorithm with an example.

(OR)

b) Explain the working of Strassen's Matrix Multiplication with the help of divide and conquer method.

13. a) Give the Pseudo code for Prim's algorithm and apply the same to find the minimum spanning tree of the graph shown below :



(OR)

b) Explain the memory function method for the knapsack problem and give the algorithm.

14. a) Give the summary of the simplex method.

(OR)

b) Prove that the stable marriage algorithm terminates after no more than n^2 iterations with a stable marriage output.

15. a) What is Class NP ? Discuss about any five problems for which no polynomial - time algorithm has been found.

(OR)

b) Elaborate on the nearest-neighbor algorithm and multifragment-heuristic algorithm for TSP problem.

PART – C **(1×15=15 Marks)**

16. a) Consider the problem of finding the smallest and largest elements in an array of n numbers.

i) Design a presorting-based algorithm for solving this problem and determine its efficiency class. **(7)**

ii) Compare the efficiency of the three algorithms :

(A) the brute-force algorithm. (B) this presorting-based algorithm, and (C) the divide-and conquer algorithm. (8)

(OR)

b) Apply Warshall's algorithm to find the transitive closure of the digraph defined by the following adjacency matrix

$$\begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

i) Prove that the time efficiency of Warshall's algorithm is cubic. (7)

ii) Explain why the time efficiency of Warshall's algorithm is inferior to that of the traversal-based algorithm for sparse graphs represented by their adjacency lists. (8)
