Hall Ticket No | | | | | | | | | | | Question Paper Code: AIT001

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Four Year B.Tech III Semester End Examinations (Supplementary) - January, 2019

Regulation: IARE – R16

DESIGN AND ANALYSIS OF ALGORITHMS

Time: 3 Hours **(Common to CSE | IT)** **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. (a) Write down Divide and Conquer recursive merge sort algorithm and derive the time complexity of this algorithm **[7M]**

   (b) Explain quicksort algorithm and simulate it for following data sequence: 3 5 9 7 1 4 6 8 2 **[7M]**

2. (a) Discuss the general plan for analyzing efficiency of non recursive and recursive algorithms? **[7M]**

   (b) When Strassen's method outperforms the traditional matrix multiplication method. How many number of multiplication operations are required during multiplication of two matrices with size of 32 x 32 in Stressen's method. **[7M]**

UNIT – II

3. (a) Explain the difference between depth first and breadth first searches? **[7M]**

   (b) Write an algorithm for searching an element using binary search method. Give an example? **[7M]**

4. (a) Discuss iterative versions of inorder, preorder and post order traversal algorithms. **[7M]**

   (b) Calculate the time complexity for the following graph shown in Figure 1 using all pairs shortest path algorithm and find the shortest paths between these three nodes. **[7M]**

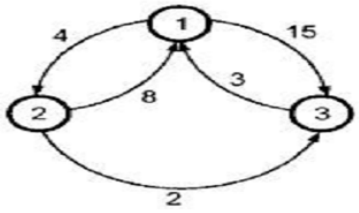

Figure 1

UNIT – III

5. (a) Describe the traveling salesman problem and discuss how to solve it using dynamic programming. **[7M]**

   (b) Give the control abstraction for subset paradigm using greedy method. Solve the job sequencing with deadline problem using greedy method for the given data N=7,P={3,5,20,18,1,6,30} are profits and D={1,3,4,3,5,1,2} are deadline respectively **[7M]**

6. (a) Write down and explain the algorithm to solve all pair's shortest path problem ? **[7M]**

   (b) Solve the instance of the Knapsack problem by branch and bound algorithm for data given in Table 1. **[7M]**

Table 1

Item	Weight	Value
1	10	$100
2	7	$63
3	8	$56
4	4	$12

UNIT – IV

7. (a) Explain the basic principle of backtracking and list the applications of backtracking. **[7M]**

   (b) Using backtracking enumerate how can you solve the following problems **[7M]**
   (i) 8-Queen (ii) Hamilton circuit problem

8. (a) Identify an example for the best case input for the branch and bound algorithm for the assignment problem? **[7M]**

   (b) Solve the following instance of traveling sales person problem using Least Cost Branch and Bound technique. **[7M]**

$$\begin{bmatrix} \infty & 12 & 5 & 7 \\ 11 & \infty & 13 & 6 \\ 4 & 9 & \infty & 18 \\ 10 & 3 & 2 & \infty \end{bmatrix}$$

UNIT – V

9. (a) Prove the following: **[7M]**
   i) CNF-SAT is NP complete ii) 3-SAT is in NP complete
   iii) CIRCUIT-SAT is in NP

   (b) Give the non-deterministic algorithm for sorting elements in non decreasing order. **[7M]**

10. (a) Explain how to implement an algorithm for Knapsack problem using NP-Hard approach. **[7M]**

    (b) Does boolean satisfiability (SAT) problem satisfy the condition of NP complete? Prove it by using Cook's theorem. **[7M]**