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INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Four Year B.Tech III Semester End Examinations (Supplementary) - July, 2018

Regulation: IARE – R16

DESIGN AND ANALYSIS OF ALGORITHMS

Time: 3 Hours

(Commo 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) Define space and time complexity of an algorithm. State the asymptotic notations used in computing the complexities. [7M]
 (b) Illustrate the merge sort algorithm by considering the following numbers 8,3,2,9,7,1,5,4 and analyze the time complexity of the algorithm. [7M]
2. (a) Illustrate the multiplication of two matrices of order 2x2 using Strassen's approach. [7M]
 (b) Solve the following recurrence relations. [7M]
 - i. $x(n) = x(n - 1) + 5f$ or $n > 1, x(1) = 0$
 - ii. $x(n) = 3x(n - 1) f$ or $n > 1, x(1) = 4$

UNIT – II

3. (a) Write the algorithm to find the depth first search and breadth first search of a graph. [7M]
 (b) Construct a depth first spanning tree for the below graph shown in Figure 1. [7M]

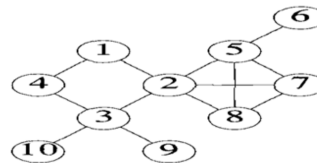


Figure 1

4. (a) Discuss the tree representation of sets. Write and explain the algorithm for union and find operation. [7M]
 (b) Define articulation points and write the biconnected graph for connected graph. [7M]

UNIT – III

5. (a) With the help of suitable example, explain the Greedy Knapsack? [7M]
(b) Find the shortest path between all pairs of nodes in the following graph shown in Figure 2. [7M]

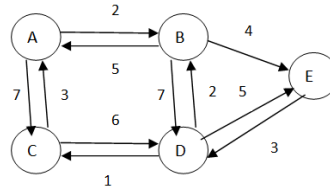


Figure 2

6. (a) Write a greedy algorithm for the shortest path problem. [7M]
(b) What is the Knapsack problem? Find an optimal solution to Knapsack problem with $n=7, m=15$
 $(P_1, \dots, P_7) = (10, 5, 15, 7, 6, 18, 3)$ and $(w_1, \dots, w_7) = (2, 3, 5, 7, 1, 4, 1)$. [7M]

UNIT – IV

7. (a) Define Hamiltonian cycle's problem. Explain with an example. [7M]
(b) Explain FIFO Branch and Bound solution. Illustrate with suitable example. [7M]
8. (a) Explain LC Branch and Bound solution with an example. [7M]
(b) Define sum of subsets. Solve sum of subsets for $n=6, m=30, W [1:6] = \{5, 10, 12, 13, 15, 18\}$. [7M]

UNIT – V

9. (a) State Cook's theorem and describe with real time applications. [7M]
(b) Describe about clique decision problem. Give suitable example. [7M]
10. (a) What is Non-deterministic algorithm for sorting? Give an example. [7M]
(b) State and prove that the 3-SAT problem is NP-Complete. [7M]

