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B.E. (Computer Engineering)
DESIGN AND ANALYSIS OF ALGORITHMS
(2019 Pattern) (Semester - VII) (410241)

Time : 2½ Hours]   *[Max. Marks : 70*

Instructions to the candidates:

1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right side indicate marks.*
4) *Assume suitable data, if necessary.*

Q1) a) Solve the matrix chain multiplication for the following 6 matrix problem using Dynamic programming. **[10]**

Matrix	A_1	A_2	A_3	A_4	A_5	A_6
Dimensions	10×20	20×5	5×15	15×50	50×10	10×15

b) Explain Greedy strategy: Principle, control abstraction, time analysis of control abstraction with suitable example. **[8]**

OR

Q2) a) Explain the 'dynamic programming' approach for solving problems. Write a dynamic programming algorithm for creating an optimal binary search tree for a set of 'n' keys. Use the same algorithm to construct the optimal binary search tree for the following 4 keys. **[10]**

Key	A	B	C	D
Probability	0.1	0.2	0.4	0.3

b) Explain Dynamic programming: Principle, control abstraction, time analysis of control abstraction with suitable example. **[8]**

Q3) a) Explain the 'branch and bound' approach for solving problems. Write a branch and bound algorithm for solving the 0/1 Knapsack problem. Use the same algorithm to solve the following 0/1 Knapsack problem. The capacity of the Knapsack is 15 kg. **[9]**

Item	A	B	C	D
Profit (Rs.)	18	10	12	10
Weight (kg.)	9	4	6	2

b) Explain with suitable example Backtracking: Principle, control abstraction, time analysis of control abstraction. **[8]**

OR

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Q4) a) What is Branch and Bound method? Write control abstraction for Least Cost search? **[9]**

b) Explain the backtracking with graph coloring problem. Find solution for following graph **[8]**

	C_1	C_2	C_3	C_4	C_5
C_1	0	1	0	1	0
C_2	1	0	1	0	0
C_3	0	1	0	1	1
C_4	1	0	1	0	1
C_5	0	0	1	0	0

Adjacency matrix for graph G

Q5) a) Write short notes on the following. **[10]**

    i) Aggregate Analysis

    ii) Accounting Method

    iii) Potential Function method

    iv) Tractable and Non-tractable Problems

b) Write short notes on with suitable example of each **[8]**

    i) Randomized algorithm

    ii) Approximation algorithm

<div align="center">OR</div>

Q6) a) What is Potential function method of amortized analysis? To illustrate Potential method, find amortized cost of PUSH, POP and MULTIPOP stack operations. **[9]**

b) What is embedded algorithm? Explain Embedded system scheduling using power optimized scheduling algorithm. **[9]**

Q7) a) Write short notes on the following. **[10]**

    i)   Multithreaded matrix multiplication.

    ii)   Multithreaded merge sort

    iii)   Distributed breadth first search

    iv)   The Rabin-Karp algorithm

   b) With respect to Multithreaded Algorithms explain Analyzing multithreaded algorithms, Parallel loops, Race conditions. **[7]**

<p align="center">OR</p>

Q8) a) Write and explain pseudo code for Multi-threaded merge sort algorithm. How parallel merging gives a significant parallelism advantage over Merge Sort? **[9]**

   b) Write a pseudo code for naïve string matching algorithm and Rabin-Karp algorithm for string matching and analyze the same. **[8]**

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