P3147

[6004]-480A

B.E. (Computer Engineering)

DESIGN ANALYSIS OF ALGORITHMS

(2019 Pattern) (Semester - VII) (410241)

Time : 2½ Hours]   *[Max. Marks : 70*

Instructions to the candidates:

1) *Solve 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 indicate full marks.*

4) *Assume suitable data, if necessary.*

Q1) a) Consider the following instance of the knapsack problem. Find the optimal solution by using dynamic programming approach. **[10]**

Item	Weight	Profit
1	2	$12
2	1	$10
3	3	$20
4	2	$15

Capacity of the knapsack = 5.

b) What is job scheduling algorithm? How job scheduling algorithm can be solved using Greedy algorithmic approach? Explain your answer with respect to Principle, control abstraction, time analysis of control abstraction, of greedy approach for the following instance of knapsack problem. **[8]**

Each job is associated with a deadline and profit.

Job	J_1	J_2	J_3	J_4	J_5
Deadline	2	1	3	2	1
Profit	60	100	20	40	20

OR

Q2) a) What is greedy approach? Explain Job scheduling algorithm using Greedy approach for following examples. Give the sequence of job scheduling. **[8]**

Input: Four jobs with following deadlines and profits

Job1D	deadline	Profit
a	4	20
b	1	10
c	1	40
d	1	30

Input: Five Jobs with following deadlines and profits

Job1D	Deadline	Profit
a	2	100
b	1	19
c	2	27
d	1	25
e	3	15

b) What is optimal binary search tree? How dynamic programming approach is used to build OBST for following tale. **[10]**

	1	2	3	4
Keys→	10	20	30	40
Frequency→	4	2	6	3

Q3) a) Explain with suitable example Backtracking: Principle, control abstraction, time analysis of control abstraction. **[8]**

b) Compare between greedy method and dynamic programming with respect to. **[9]**

i) Feasibility.

ii) Optimality.

iii) Recursion.

iv) Memorization.

v) Time complexity.

OR

Q4) a) What is sum of subset problem? Solve sum of subset problem for following instance using backtracking approach. **[8]**

Input : set [] = {2, 3, 5, 6, 8, 10}, sum = 10

b) What is Branch and Bound method? Write control abstraction for Least cost search? **[9]**

Q5) a) What is amortized analysis? Explain aggregate and potential function methods used for amortized analysis with respect to stack operations? **[9]**

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

OR

Q6) a) Write short notes on the following. **[10]**

i) Aggregate analysis.

ii) Accounting Analysis.

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.

Q7) 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) i) Explain an algorithm for Distributed Minimum Spanning Tree. **[8]**

ii) Write and explain Rabin-Karp algorithm for string matching.

OR

Q8) 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]**

✿ ✿ ✿