R18

Code No: 156AN

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, March - 2024
DESIGN AND ANALYSIS OF ALGORITHMS
(Common to CSE, ECM, CSBS, ITE)

Time: 3 Hours **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a)	Explain the term amortized efficiency.	[2]
b)	Define the following asymptotic notations: big 'Oh', omega and theta.	[3]
c)	What is meant by a backtracking? Explain.	[2]
d)	Given two sets where A = {1, 2, 3, 4, 5, 6} and B = {10, 11, 12, 13, 14, 15, 16}, find out whether they are disjoint.	[3]
e)	What is the importance of knapsack algorithm in our daily life?	[2]
f)	Differentiate between greedy method and dynamic programming.	[3]
g)	What is a Minimum Cost Spanning tree?	[2]
h)	Distinguish between Prim's and Kruskal's spanning tree algorithm.	[3]
i)	Define Class P.	[2]
j)	Compare LC branch-and-bound and FIFO branch- and-bound.	[3]

PART – B

(50 Marks)

2.a) What is the basic methodology of divide and conquer algorithm? List the advantages of Divide and conquer algorithm.
b) Explain strassen's matrix multiplication through divide and conquer method. [5+5]

OR

3.a) Illustrate the result of running Merge sorting technique on the sequence:
38,27,43,3,9,82,10.
b) Derive the Best, Worst and Average time complexities of Merge sorting technique. [5+5]

4.a) Discuss about weighting rule for finding UNION of sets and collapsing rule.
b) Write an algorithm to solve 8-queen problem and show the state space tree. [5+5]

OR

5.a) Write an algorithm for finding all m-coloring of a graph with example.
b) Device backtracking algorithm to find all solutions to the n-queens problem and represent the solution space in state space tree. [5+5]

6.a) Discuss the time and space complexity of traveling sales person problem using dynamic programming approach.

b) What is principle's of optimality? Explain how travelling sales person problem uses the dynamic programming technique with example. [5+5]

OR

7.a) What is All – Pair Shortest Path problem (APSP)? Explain with example.

b) Solve the following instance of 0/1 Knapsack problem using Dynamic programming
n = 3; (W1, W2, W3) = (3, 5, 7); (P1, P2, P3) = (3, 7, 12); M = 4 [5+5]

8.a) Derive time complexity for prim's method and kruskal's method to generate minimum cost spanning tree.

b) Find an optimal sequence to the n = 5 Jobs where profits (P1, P2, P3, P4, P5) = (20, 15, 10, 5, 1) and deadlines (d1, d2, d3, d4, d5) = (2, 2, 1, 3, 3). [5+5]

OR

9.a) Explain Kruskal's Minimum cost spanning tree algorithm with suitable example.

b) Discuss about single source shortest path problem. [5+5]

10.a) Distinguish between backtracking and branch – and bound techniques.

b) Explain 0/1 Knapsack problem with respect to branch and bound method. [5+5]

OR

11.a) Solve the Travelling Salesman problem using branch and bound algorithms.

b) Distinguish between NP- hard and NP-complete problems. [5+5]

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