

**R18**

Code No: 156AN

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year II Semester Examinations, February - 2023

**DESIGN AND ANALYSIS OF ALGORITHMS**

(Common to CSE, 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) What is an algorithm? [2]
- b) Explain about big-oh notation. [3]
- c) Define static space tree. [2]
- d) Write and explain general iterative backtracking method. [3]
- e) What is the time complexity of all pairs shortest path? [2]
- f) Explain about OBST. [3]
- g) What is Greedy method? [2]
- h) Distinguish between Prim's and Kruskal's algorithms. [3]
- i) Define branch and bound technique. [2]
- j) Explain about non-deterministic algorithms. [3]

**PART – B**

**(50 Marks)**

- 2.a) Write and explain the general method of divide-and-conquer strategy.
- b) Derive the time complexity of Strassen's matrix multiplication. [5+5]

**OR**

- 3.a) Write and explain recursive algorithm of binary search method.
- b) What is space complexity? Explain with suitable examples. [5+5]

- 4.a) Describe recursive formulation of backtracking technique.
- b) How to implement disjoint sets? Explain. [5+5]

**OR**

- 5.a) Explain about 4-queens problem with backtrack solution.
- b) Discuss about number of connected components of a graph using disjoint set union. [5+5]

6. Use the function OBST to compute  $w(i, j)$ ,  $r(i, j)$ , and  $c(i, j)$ ,  $0 \leq i < j \leq 4$ , for the identifier set  $(a_1, a_2, a_3, a_4) = (\text{do}, \text{if}, \text{int}, \text{while})$  with  $p(1:4) = (3, 3, 1, 1)$  and  $q(0:4) = (2, 3, 1, 1, 1)$ . Using the  $r(i, j)$ 's construct the optimal binary search tree. [10]

**OR**

7. Discuss about all pairs shortest problem using dynamic programming. [10]

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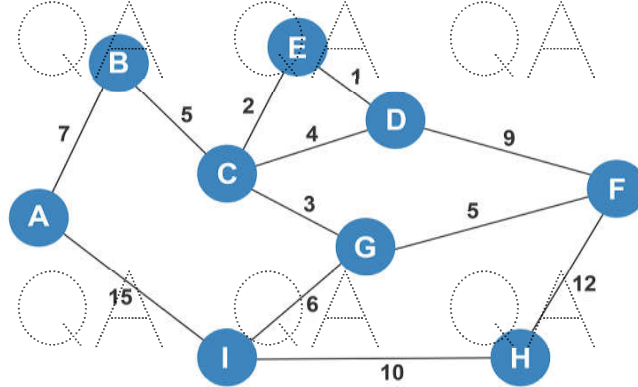
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8. Compute a minimum cost spanning tree for the graph shown below using  
 a) Prim's algorithm and  
 b) Kruskal's algorithm.

[5+5]



OR

9. Explain about single source shortest path problem in Greedy method.

[10]

10. Describe LC branch and bound solution of 0/1 Knapsack problem in detail.

[10]

OR

11. Explain the following:

- a) Nondeterministic knapsack algorithm  
 b) FIFO branch and bound.

[5+5]

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