

2018

Full Marks - 40

Time - 3 hours

The figures in the right-hand margin indicate marks

Answer *all* questions.

1. a) Show that
 $f(n) + g(n) = O(n^2)$ where $f(n) = 3n^2 - n + 4$ and
 $g(n) = n \log n + 5$. 5
- b) Describe and write quick sort algorithm. Show how quick sort sorts the following sequence of keys 310, 285, 179, 652, 351, 423, 861, 254, 450, 520. Analyse time complexity of the algorithm. 5

OR

- c) How to calculate time and space complexity of an algorithm? Explain. 5
- d) Justify the statement "Asymptotically more efficient algorithms are usually the better choice for all but small inputs" with suitable examples of notations. 5

[2]

2. Write a pseudo code for divide and conquer algorithm for merging two sorted arrays into a single sorted one. Explain with example. 10

OR

- a) Explain Miller Robbin Primality test with an example. 5
- b) Explain Fibonacci heap. 5

3. a) How to solve Knapsack problem with Dynamic programming? How is it different from greedy method? 5

- b) Draw the tree organization of the 4-queen solution space and number the nodes using DFS. 5

OR

- c) What is the backtracking? Give the solution for the 8 queen's problem. 5
- d) Differentiate between divide and conquer method and greedy method. 5

[3]

4. a) Describe Dijkstra's algorithm to solve single-source shortest path problem. What is its time complexity? 5

- b) What are string matching algorithms? 5

OR

- c) Define spanning tree. Write Kruskal's algorithm for finding minimum cost spanning tree. Describe how Kruskal's algorithm is different from Prim's algorithm for finding minimum cost spanning tree. 10

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