

R13

Code No: 114CT

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year II Semester Examinations, April - 2018

DESIGN AND ANALYSIS OF ALGORITHMS

(Information Technology)

Time: 3 Hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit.

Each question carries 10 marks and may have a, b, c as sub questions.

PART-A**(25 Marks)**

- 1.a) Write the algorithm for recursive permutation generator. [2]
- b) Explain the usefulness of the UNION operation on sets. [3]
- c) Write the control abstraction for greedy method. [2]
- d) Discuss Knapsack problem. [3]
- e) List out the advantages of dynamic programming. [2]
- f) State the principle of optimality. [3]
- g) List the applications of Backtracking. [2]
- h) Give the solution for the 8 queens problem. [3]
- i) Define class P. [2]
- j) What are non-deterministic algorithms? [3]

PART-B**(50 Marks)**

- 2.a) Develop the algorithm for Find using collapsing rule with an example.
- b) Draw the tree of calls of merge sort for the following set.
(35, 25, 15, 10, 45, 75, 85, 65, 55, 5, 20, 18) [5+5]

OR

- 3.a) Explain about Amortized Analysis.
- b) Analyze the time complexity of quick sort for best, average and worst cases. [5+5]
- 4.a) Demonstrate the kruskal's algorithm to find the minimum spanning tree by taking an illustrative graph.
- b) Consider the following instance of Knapsack problem $N=3$, $M=20$,
 $(p_1, p_2, p_3)=(25, 24, 15)$, $(w_1, w_2, w_3)=(18, 15, 10)$
Calculate Maximum profit, Minimum weight and Maximum profit per unit weight. [5+5]

OR

- 5.a) Explain job sequencing with deadlines with a suitable example.
- b) Illustrate single source shortest path problem with a suitable example. [5+5]

- 6.a) Write an algorithm for 0/1 Knapsack Problem using Dynamic Programming.
b) Use function OBST to compute $w(i,j)$, $r(i,j)$ and $c(i,j)$, $0 \leq i < j \leq 4$, for the identifier set $(a_1, a_2, a_3, a_4) = (\text{count, float, if, while})$ with $p(1)=1/20$, $p(2)=1/5$, $p(3)=1/10$, $p(4)=1/20$, $q(0)=1/5$, $q(1)=1/10$, $q(2)=1/5$, $q(3)=1/20$, and $q(4)=1/20$. Using the $r(i,j)$'s, construct the Optimal Binary Search Tree. [5+5]

OR

- 7.a) Consider three stages of a system with $r_1=0.3$, $r_2=0.5$, $r_3=0.2$ and $c_1=30$, $c_2=20$, $c_3=30$ Where the total cost of the system is $C=80$ and $u_1=2$, $u_2=3$, $u_3=2$ find the reliability design.

- b) Explain and write the algorithm for travelling salesman problem. [5+5]

- 8.a) Describe the backtracking technique to m-coloring graph. Explain with an example.

- b) Discuss the general method of Branch and Bound. [5+5]

OR

- 9.a) Briefly explain sum of subsets problem using backtracking. Explain its applications.

- b) Solve 0/1 knapsack problem using Branch and Bound. [5+5]

- 10.a) Briefly explain Cooks-theorem.

- b) Explain the NP, NP-Hard and NP- complete classes with suitable examples. [5+5]

OR

- 11.a) How are P and NP problems related? Give the relation between NP-hard and NP problems.

- b) Compare and contrast deterministic and nondeterministic algorithms. [5+5]

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