Code No: 124CT

R15

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), $0<=I<j<=4$, for the identifier set (a_1, a_2, a_3, a_4)=(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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