Code No: 114CT **R13**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year II Semester Examinations, November/December - 2015
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)	Explain the properties of an algorithm.	[2M]
b)	Write an algorithm of weighted union.	[3M]
c)	What are the applications of minimum cost spanning tree.	[2M]
d)	Write an algorithm of greedy knapsack.	[3M]
e)	Explain how dynamic programming is useful to solve 0/1 Knapsack.	[2M]
f)	Explain the importance of all pairs shortest path problem.	[3M]
g)	Find the sum of sets for the following set of integers by fixed tuple. {1,2,3,5,6,7,8,9,10} for W=8.	[2M]
h)	What is meant by branch and bound.	[3M]
i)	Write a nondeterministic search algorithm.	[2M]
j)	Distinguish between P and NP.	[3M]

PART-B

(50 Marks)

2.a) Solve the recurrence: T(n)=4T(n/2)+n, Where $n \geq 1$ and is a power of 2.
b) Write an algorithm for the finding the GCD of two numbers and also find the time complexity of the same. [5+5]

OR

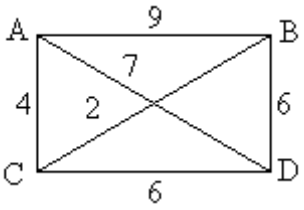
3.a) Write an algorithm of Fibonacci of n given numbers and also find its Complexity.
b) Explain the asymptotic notations with an example. [5+5]

4. Explain the prim's and Kruskal's algorithms. [10]

OR

5.a) Write a control abstraction for the subset parading using greedy method.
b) What is the solution generated by using job sequencing with deadlines when n=7, (P1, P2, P3 …..P7) = (3, 5, 20, 18, 1, 6, 30), and (d1, d2,…..d7) = (1, 3, 4, 3, 2, 1, 2). [5+5]

6.a) Solve the travelling sales person problem by using the dynamic programming.



b) Write an algorithm of OBST. [5+5]

OR

7. Consider 4 elements al < a2 < a3 < a4 with

$q(0) = \frac{1}{8}$, $q(1) = \frac{1}{16}$, $q(2) = q(3) = q(4) = \frac{1}{16}$: $p(1) = \frac{1}{4}$, $p(2) = \frac{1}{8}$, $p(3) = p(4) = \frac{1}{16}$.

Construct the table of values of W (i, j), R (i, j) and C(i, j) computed by the algorithm to compute the roots of optimal sub trees. [10]

8.a) Draw the portion of the state space tree generated by LCBB for the following knapsack instances: n=5, $(P_1, P_2, P_3, P_4, P_5) = (10, 15, 6, 8, 4)$,

$(W_1, W_2, W_3, W_4, W_5) = (4, 6, 3, 4, 2)$ and m = 12.

b) Explain in detail how the technique of backtracking can be applied to solve the 8-queens problem. [5+5]

OR

9. Consider the traveling sales person instance defined by the cost matrix

$$\begin{bmatrix} \infty & 7 & 3 & 12 & 8 \\ 3 & \infty & 6 & 14 & 9 \\ 5 & 8 & \infty & 6 & 18 \\ 9 & 3 & 5 & \infty & 11 \\ 18 & 14 & 9 & 8 & \infty \end{bmatrix}$$

a) Obtain the reduced cost matrix

b) Obtain the state space tree that will be generated by LCBB. Label each node by its $\hat{C}$ value. Write out the reduced matrices corresponding to each of these nodes. [5+5]

10. Explain 0/1 knapsack problem and cook's theorem. [10]

OR

11.a) Show that the Hamiltonian cycle problem is reducible to the traveling sales person problem (Choose either directed or undirected graphs for both problems).

b) Explain non-deterministic algorithms. [5+5]

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