## **R13** Code No: 114CS JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD B.Tech II Year II Semester Examinations, October/ November- 2016 **DESIGN AND ANALYSIS OF ALGORITHMS** (Computer Science and Engineering)

#### Time: 3 Hours

**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)	Define the time complexity.	[2]
b)	List out the reasons for the difficulties that one faces while determini	ng the lower
	bound.	[3]
c)	Write an algorithm of simple union.	[2]
d)	What are the applications of game tree?	[3]
e)	Write an algorithm of greedy knapsack.	[2]
f)	State the principle of optimality.	[3]
g)	Define State space tree.	[2]
h)	Write the control abstraction algorithm for LC search.	[3]
i)	What is the relation between NP-hard and NP-complete?	[2]
j)	Distinguish between deterministic and non deterministic algorithm.	[3]

## **PART-B**

#### (50 Marks)

[5+5]

[5+5]

- Trace the quick sort algorithm to sort the list C, O, L, L, E, G, E in alphabetical 2.a) order.
  - Solve the following recurrence: b) T(n)=4T(n/2)+n, Where  $n \ge 1$  and is a power of 2. [5+5] OR
- Write the non-recursive algorithm for finding the Fibonacci sequence and define 3.a) its time complexity.
  - b) Consider the following recurrence equation:

$$\mathbf{T}(\mathbf{n}): \mathbf{T}(\mathbf{n}) = \begin{cases} 1 & \text{if } n = 1 \\ T(n-1) + n^n & \text{otherwise} \end{cases}$$

- 4.a) Explain the graph traversal with an example. Write an algorithm for AND/OR Graphs. b) [5+5]ÓR
- 5.a) Write a non recursive algorithm of post order tree traversal.
- Differentiate between BFS and DFS. b)

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### Max. Marks: 75

6. Write an algorithm of Prim's minimum cost spanning tree.

#### OR

[10]

7. Consider 4 elements al < a2 < a3 < a4 with  $q(0) = \frac{1}{8}$ ,  $q(1) = \frac{1}{16}$ ,  $q(2) = q(3) = \frac{1}{16}$ 

 $q(4) = \frac{1}{16}$ :  $p(1) = \frac{1}{4}$ ,  $p(2) = \frac{1}{8}$ ,  $p(3) = p(4) = \frac{1}{16}$ . 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. Draw the portion of the state space tree generated by LC branch and bound for an instance n=4, (P1, P2, P3, P4)= (10,10,12,18), (w1, w2, w3, w4)=(2, 4, 6, 9), and m=15. [10]

#### OR

- 9.a) Explain the 4-queen problem using backtracking.
- b) Draw the state space tree for m-coloring graph. [5+5]
- 10.a) Show that the HAMILTONIAN\_CYCLE problem on directed graphs is NP-complete.
  - b) State the cook's theorem. What is the significance of this theorem? [5+5] OR
- 11.a) Prove that CNF satisfiability of AND/OR graph decision problem.
  - b) Explain the classes of NP-hard and NP-complete. [5+5]

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