Code No: 114CS **R13**

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 **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) Define the time complexity. [2]
b) List out the reasons for the difficulties that one faces while determining 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)

2.a) Trace the quick sort algorithm to sort the list C, O, L, L, E, G, E in alphabetical order.
b) Solve the following recurrence:
T(n)=4T(n/2)+n, Where $n \geq 1$ and is a power of 2. [5+5]

OR

3.a) Write the non-recursive algorithm for finding the Fibonacci sequence and define its time complexity.
b) Consider the following recurrence equation: [5+5]

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

4.a) Explain the graph traversal with an example.
b) Write an algorithm for AND/OR Graphs. [5+5]

OR

5.a) Write a non recursive algorithm of post order tree traversal.
b) Differentiate between BFS and DFS. [5+5]

6. Write an algorithm of Prim's minimum cost spanning tree. [10]

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. 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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