(Please write your Exam Roll No.) Exam Roll No. .....

END TERM EXAMINATION

SIXTH SEMESTER [B.TECH (IT)] MAY-JUNE 2018

Paper Code: IT-306 Subject: Algorithm Analysis and Design

Time: 3 Hours Maximum Marks: 75

Note: Attempt five questions in all including Q no.1 which is compulsory. Select one question from each unit.

UNIT-I

Q1 (a) Explain the Strassen matrix multiplication technique. **(5)**

(b) Explain the different asymptotic notations. **(5)**

(c) Define the polynomial time verification. **(5)**

(d) Write down a non recursive version of FIND-SET with path compression. **(5)**

(e) What is quick sort? Show its functioning with data? **(5)**

UNIT-II

Q2 (a) Assume that T (n) is constant for sufficiently small n and solve the following recurrence relation. **(6)**

(i) $T(n) = 7T(n/2) + n^2$ by substitution

(ii) $T(n) = 16T(n/4) + n^2$ by recursion tree

(iii) $T(n) = T(\sqrt{n}) + 1$

(b) Write an algorithm MEDIAN to get median element from sequence S of n elements. **(6.5)**

Q3 Write and explain randomized select algorithm which returns smallest number of an array. Find out the time complexity of algorithm. **(12.5)**

UNIT-II

Q4 (a) Given a set of elements 3,6,4,1,3,4,1,3,6 sort them using counting sort. Also write the pseudocode and its complexity. **(6)**

(b) Write Dijkstra' algorithm for solving single source shortest path algorithm. Also give the proof of correctness of the algorithm. **(6.5)**

Q5 Explain the elements of dynamic programming. Find the Longest common subsequence between elephant and eaten by using dynamic programming paradigm. Also write the recursive pseudocode with memoization. **(12.5)**

UNIT-III

Q6 (a) What is an optimal Huffman code for following set of frequencies, based on first 8 fibonacci numbers? a:1 b:1 c:2 d:3 e:5 f:8 g:13 h:21 ? Also discuss why we use Huffman coding **(7.5)**

(b)Compare greedy algorithm with dynamic programming? Find the optimal solution to the knapsack problem n =3,m =20, (p1,p2,p3)= (25,24,15) and (w1,w2,w3)=(18,15,10) **(5)**

Q7 Explain the difference between DFS and BFS with example. Solve topological sorting problem using DFS algorithm with an example **(12.5)**

UNIT-IV

Q8 (a) Define finite automata. Explain string matching algorithm using finite automata with appropriate example. **(6)**

(b) Compute the prefix function π of pattern =abababababbaca. Write the pseudocode of KMP and give the run time analysis **(6.5)**

Q9 Briefly explain the concepts of P, NP and NP complete problem. Discuss any two NP complete problems in detail. **(12.5)**

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