(Please write your Exam Roll No.) Exam Roll No. 35514082416

END TERM EXAMINATION

FOURTH SEMESTER [MCA] MAY-JUNE 2018

Paper Code: MCA-202 **Subject: Design and Analysis of Algorithms**

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt any five questions including Q no. 1 which is compulsory.

Q1 Differentiate between following:- **(5x5=25)**

(a) Deterministic and nondeterministic algorithm.
(b) Time complexity and space complexity.
(c) Dynamic Paradigm and Greedy Paradigm to solve any problem.
(d) P, NP, NP-hard and NPC
(e) Determine 0/1 Knapsack problem.

Q2 (a) Give Asymptotic upper and lower bound for T(n) in each of the following recurrence relation: **(6.5)**

(i) $T(n) = 2T(n/2) + n^3$
(ii) $T(n) = T(n-1) + n$
(iii) $T(n) = 2T(n/4) + n^2$

(b) What is the behind divide and conquer method. Explain with example. **(6)**

Q3 (a) Write an algorithm for Quick Sort and Explain. Also find its complexity in worst case, average case and burst case. **(6)**

(b) Perform Quick sort dry run on following data. Show the various steps involved in the quick sorting of the data. (1,3,4,-5,9,2,6,5,3) **(6.5)**

Q4 (a) Write an algorithm for Matrix Chain Multiplication and Explain why this strategy comes under the dynamic paradigm. **(5.5)**

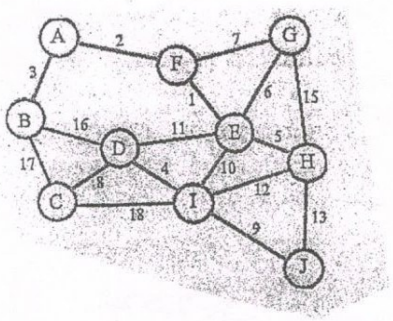
(b) Find optimal parenthesization of matrix-chain product whose sequence of dimensions as follows: **(7)**
5,10,3,15,2,20

Q5 (a) Explain the algorithm for string matching with finite automata. Compare its complexity with other string matching algorithms. **(5.5)**

(b) Construct the string matching automation for the pattern P='aabab' and illustrate its operations on the text string 'aaababaabaababaab'. **(7)**

Q6 (a) Write any one algorithm for minimum spanning tree generation and explain. Find its complexity. 'Discuss the advantage of generating minimum spanning tree in computer networks. **(6)**

(b) For the following graph generate the spanning tree using Kruskal's method and Prims method. Are both the spanning tree same? Justify. **(6.5)**



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MCA-202
P.1/2

Q7 (a) How to solve the sum of subset problem using approximation algorithms? Also find its time complexity. **(6)**

(b) Prove that any algorithm that works by comparing keys to find the second largest from a set of n keys must do at least n+log n-2 comparisons in the worst case. **(6.5)**

Q8 (a) Prove that Hamiltonian Cycles is NP complete problem. **(5.5)**

(b) Explain the relationship between NP-completeness and reducibility. Give definition of NP complete language. **(7)**

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