

# END-TERM EXAMINATION

FOURTH SEMESTER [B.TECH.] - MAY 2008

Paper Code: ETCS204

Paper ID: 27204

Time : 3 Hours

Subject: Algorithm Analysis and Design

(Batch: 2004-2006)

Maximum Marks : 75

Note: Attempt all questions. Internal choice is indicated.

- Q.1 (I) (a) Solve the recurrence  $T(n) = 2T(\sqrt{n}) + \log n$ . (3)
- (b) Distinguish between the followings: - (4)
- (i) Big O notation and little O notation.
- (ii) Big Omega notation and little Omega notation.
- (II) What do you mean by dynamic programming? Design an algorithm for finding the first n Fibonacci numbers using it. (6)
- (III) Explain the following with the help of suitable example and diagram (6)
- (a) BFS (b) DFS
- (IV) Explain the following: - (6)
- (a) p-problems
- (b) NP-problems
- (c) NP-complete problem
- (d) NP-hard problem

- Q.2 (a) State Master Theorem. Use it to give tight asymptotic bounds for the followings. (12.5)
- (i)  $T(n) = 4T(n/2) + n^2$
- (ii)  $T(n) = 4T(n/2) + n^3$
- The recurrence time  $T(n) = 7T(n/2) + n^2$  describes the running time of an algorithm A. A competing algorithm A' has a running time of  $T'(n) = aT'(n/4) + n^2$ . What is the largest integer value for a such that A' is asymptotically faster than A?

OR

- (b) Write merge sort algorithm and do analysis of its computational complexity. Run the algorithm to sort the list PEOPLE. (12.5)

- Q.3 (a) Design an algorithm for solving the problem of matrix chain multiplication using the concept of dynamic programming. Also find its time complexity. (12.5)

OR

- (b) Distinguish between dynamic programming and greedy approach of solving problems with the help of suitable example. Design an algorithm for an activity selection problem using greedy approach. Discuss its computational complexity. (12.5)

- Q.4 (a) What do you mean by minimum spanning tree? Write and explain the following algorithms. (12.5)
- (i) Prim's algorithm
- (ii) Kruskal algorithm
- Also find their computational complexities.

OR

- (b) Describe the following algorithms. (12.5)
- (i) Bellman Ford Algorithm
- (ii) Dijkstra's Algorithm

- Q.5 (a) Write and explain Knuth-Morris pratt algorithm and discuss its computational complexity. (12.5)

OR

- (b) Write and explain the Rabin-Karp Algorithm and discuss its computational complexity. (12.5)

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