SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE E **JUNE 2006**

CS 2K 601—DESIGN AND ANALYSIS OF ALGORITHM

Time: Three Hours

: 100 Marks

- 1. (a) Briefly describe the different hashing functions.
 - (b) Explain master theorem and solve $T(n) = 2T(\frac{n}{2}) + n^2$.
 - (c) Describe the Floyd Warshall algorithm.
 - (d) Distinguish between clan P and NP problems.
 - (e) What is eight queen problem?
 - Describe Huffman coding.
 - Show that the vertex cover problem is NP complete.
 - (h) What is universal hashing?

 $(8 \times 5 = 40 \text{ marks})$

II. (a) (i) Prove that the running time of an algorithm is $\theta(g(n))$ if and only if its worst case running time is O(g(n)) and its best case running time is O(g(n)).

(10 marks)

(ii) Explain the RAM model.

(5 marks)

(b) (i) Describe the potential method of amortized analysis.

(7 marks)

(ii) Write an algorithm for quicksort and calculate its average and worst case time complexity.

III. (a) Describe the dynamic programming algorithm design technique with the help of suitable examples.

(15 marks)

- (b) Give any one greedy algorithm for finding the minimum cost spanning tree. Analyse it. (15 marks)
- IV. (a) (i) Distinguish between NP hard and NP complete problems.

(5 marks)

(ii) Give a polynomial time algorithm to compute the nth Fibonacci number. Analyse the asymptotic order of your algorithm.

(10 marks)

Or

(b) Suggest an approximation algorithm for traveling sales person problems using minimum spanning tree algorithm. Assume that the cost function satisfies the triangle inequality.

(15 marks)

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V. (a) (i) What is the success rate in Monte-Carlo experimentation?

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(6 marks)

(ii) Write down Pollard's rho heuristic. Mention the advantages.

(9 marks)

(b) Explain Miller-Rabin primality test. How does it overcome the problems of pseudo primality testing. 10001 127

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(10 marks)

(ii) Comment about the error rate of Miller-Rabin primality test.

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(5 marks)

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