B. Tech Degree VIII Semester Examination, April 2008

CS/IT 805 (C) ALGORITHMS AND COMPLEXITY

(1999 – 2001 Scheme)

Time : 3 Hours Maximum Marks : 100

I. (a) Explain the relationship between the turing machine and RAM models. (10)

(b) Give an algorithm for depth-first search and breadth first search in an undirected graph. (10)

OR

II. (a) Describe NP – complete. Show that 3 – satisfiability is NP complete. (10)

(b) Give an algorithm for heap sort. Analyse its complexity. (10)

III. (a) Describe an algorithm for finding the biconnected components of an undirected graph. (10)

(b) Explain dynamic programming with the help of a example. (10)

OR

IV. (a) Describe the Prim's algorithm for finding minimum cost spanning tree in an undirected graph. (10)

(b) Explain an algorithm to construct an optimal binary search tree. (10)

V. (a) Give the four Russian's Boolean matrix multiplication algorithm. Using the above algorithm compute the product of the Boolean matrices.

$$A=\begin{bmatrix}1&0&0&1\\0&0&1&1\\1&0&1&1\\0&0&1&0\end{bmatrix} \quad \text{and} \quad B=\begin{bmatrix}0&1&0&0\\1&0&1&0\\0&0&1&0\\1&1&0&1\end{bmatrix}$$ (15)

(b) Explain why Strassen's matrix multiplication algorithm can not apply directly to Boolean matrix multiplication. (5)

OR

VI. (a) Describe the discrete Fourier transform of a vector. (5)

(b) Using LUP decomposition find the determinant of the matrix.

$$M=\begin{bmatrix}0&0&1&2\\0&0&3&0\\1&-1&0&1\\2&0&-1&3\end{bmatrix}$$ (15)

VII. (a) Explain an algorithm for polynomial reciprocals. Using the above algorithm find the reciprocal of the polynomial.

$$x^7-x^6+x^5+2x^4-x^3-3x^2+x+4$$ (15)

(b) Describe modular arithmetic. (5)

OR

VIII. (a) Give an algorithm to compute integer from modular representation. Using this find the integer value where the modular representation is (1, 2, 4, 3). Assume $P_0 = 2$, $P_1 = 3$, $P_2 = 5$, $P_3 = 7$ be the moduli. (15)

(b) Explain sparse polynomials. (5)

IX. (a) Explain a parallel algorithm for finding the maximum value in a set of key values. (10)

(b) Describe the PRAM model. (10)

OR

X. (a) Describe an algorithm for the parallel connected components in a graph. (10)

(b) Explain the algorithm for parallel sorting. (10)

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